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EDITORIAL

THOUGH the exact value of artificial pneumothorax in the treatment of pulmonary tuberculosis is still unsettled, there is fairly general agreement that a pleural space free from important adhesions is an indispensable requisite for success. This point was emphasised in the recent paper by Hjaltested and Törning.* Reviewing their experience of the late results of the treatment, they showed clearly how the presence of adhesions, interfering with the satisfactory collapse of affected lung, could be related to a poor prognosis in the long run. Their figures confirm the impression that a very rigid limit is set to the value of treatment by pneumothorax, in so far as adhesions are almost the rule rather than the exception in most forms of the disease, and also in so far as their surgical division has hitherto been regarded widely as a procedure often fraught with danger even in the most skilled hands. There is no doubt that this combination of circumstances has had much to do with a healthy scepticism about artificial pneumothorax among many of those with wide experience of its successes. These successes are seen largely in those few with no adhesions, and in those whose adhesions have been divided without catastrophe; the failures are found among those with indivisible adhesions, among those in whom division has been attempted with resulting complications, and among those in whom it has been avoided because of the risks.

It is clear that one important factor in any future improvement of the late results of treatment by pneumothorax is thus a reduction of the number of patients in the last two categories. It has been equally clear that no general advance in this direction was likely to be made until the conviction could be established that the risks of dividing adhesions were far less than the risks of leaving them alone. This in turn depended upon an increase in the ability to recognise those adhesions which are safely divisible from those which are not, and upon the demonstration that the methods used

* Hjaltested, O., and Törning, K., *Brit. Journ. Tubercul.*, 1939, 33, 4.

are in themselves free from troublesome sequelæ. There is already in the literature a vast amount of recorded observation on these points, and the work of Jacobaeus, Matson, Unverricht, Alexander, Chandler and many others has already carried conviction a long way. In a recent paper, however, Brock* has demonstrated, perhaps more convincingly than ever before, how far advances in this important field have now brought the operation of dividing adhesions to a point where it may be regarded as little more than an annoying but reasonably safe incident in the course of treatment.

Brock records his personal experiences based upon 442 consecutive operations. He prefers two cannulæ to one, using posterior and mid-axillary sites, and galvano-cautery to diathermy, for a variety of technical reasons. He warns at the outset of the difficulties of the technique, and there is no question that individual judgement and skill play a major part in ensuring success. He emphasises the importance of knowing the probable internal structure of an adhesion, especially whether it is likely to contain lung tissue or not, for upon this rests the safety of division. The formation of the various types of adhesions and their structure is given at length; those easily and safely divisible, those requiring enucleation from the chest wall, and those divisible only with grave risk are described. The wide adhesion containing pulmonary tissue directly fixed to the chest wall is frequently a cause of suspension of the apex of the lung on its mediastinal aspect, where it may vitiate all attempts to collapse the apex by the division of lateral and apical bands. This problem is insoluble by intrapleural pneumonolysis but may often be successfully solved by open extrapleural dissection.

Turning to the complications following cauterisation of adhesions, Brock found that in 360 operations on 302 subjects there was either no reaction or a trivial one on 315 occasions (87·5 per cent.). A severe or prolonged reaction occurred on eighteen occasions (5 per cent.) only. No more than forty-seven (13 per cent.) of the operations led to effusions, and only ten (2·8 per cent.) of these were purulent, half of which were infected by secondary pyogenic organisms. Hæmothorax resulted on three occasions only. Surgical emphysema and vomiting, though frequent complications, were never serious.

These figures give striking support to the view that internal pneumonolysis has reached the stage when it should be regarded as a safe procedure in skilled hands. The wider recognition of this fact should materially contribute to an improved prognosis for a large group of patients treated by artificial pneumothorax.

* Brock, R. C., Brompton Hospital Reports, 1938, 7, 81.

GENERAL ARTICLES

SOME OBSERVATIONS ON TUBERCULOMAS OF THE BRAIN

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The incidence of tuberculoma of the brain varies enormously according to the observer and the locality in which the figures are made up. Cushing gives the incidence of tuberculoma of the brain as 2·8 per cent. of cases of cerebral tumour. Garland and Armitage found that in 13,000 necropsies performed at Leeds from 1910-1931, 264 were cases of cerebral tumour. Of these, no less than 89, or 33·8 per cent., were tuberculomas, so that it is not easy to give a figure as to the actual incidence.

In my own series of 590 intracranial tumours there were ten cases of tuberculomas.

Tuberculomas are far commoner in childhood than in adult life in a ratio of about 4 to 1. Below twenty-three years of age approximately 60 per cent. of cerebral tumours diagnosed were found to be tuberculomas. The lesion is of two types:

1. The circumscribed tuberculoma.
2. The tuberculoma " en plaque," which affects the meninges.

1. *The circumscribed tuberculoma* may occur anywhere in the brain tissue. It is much commoner, however, in the cerebellum than in the cerebrum (Fig. 1). The tumour may be single or loculated, showing one large cyst and several adjacent smaller cysts.

Occasionally they are disseminated throughout the brain substance, and may occasionally be found in the cord.

The lesion is typical of any tuberculous lesion. Depending on the rate of growth and the resistance of the patient, the tuberculoma may emerge into the surrounding brain substance, or show a definite capsule. The more slow-growing the lesion the thicker the capsule.

The size varies from that of a millet seed to a hen's egg. They are often very firm and at operation closely resemble a cerebral tumour (Fig. 2). On section there is a zone of necrosis in the centre associated with caseation. The centre is dry and yellowish with a tendency to crumble. Occasionally, if more active, the centre is diffluent with a greyish-red peripheral growing zone.

Microscopic section shows three layers: (1) Central area of necrosis; (2) a zone with giant cells, lymphocytes, plasma cells, leucocytes and an increase in glial tissue, in which tubercle bacilli may rarely be demonstrated; (3) a zone in the surrounding brain tissue showing degenerated nerve cells and nerve fibres. The small bloodvessels are thrombosed and show a lymphocytic cuffing. Fat-laden microglia may be found in large numbers in this layer and hypertrophied astrocytes. Daughter tubercles often surround the main mass.

The meninges are also involved in the neighbourhood of the region affected (Fig. 3). To the naked eye there is reddening of the meninges, and actual tubercles may be seen. Microscopic section may show a picture typical of tuberculous meningitis.

It has been stated that tuberculomas of the brain only give rise to symptoms when meningitis has supervened. This, however, is open to grave doubt, as deep-seated lesions occur in which both macroscopic and microscopic investigation of the meninges fail to show any tuberculous reaction.

Tuberculous meningitis occurs in 75 per cent. of cases according to some observers, but in a large series of cases only 16 per cent. of cases of tuberculous meningitis were associated with tuberculoma of the brain.

Changes in the cerebro-spinal fluid are common if the lesion is adjacent to the meninges. The cerebro-spinal fluid is under pressure, the protein is increased and there may be a pleocytosis. The cells are predominantly lymphocytes.

Secondary changes are produced inside the skull as a result of the presence of a tuberculoma—especially with those arising in the posterior fossa (Fig. 4). There are the changes of hydrocephalus. There is a blocking of the ventricular system from pressure on the aqueduct or on the roof of the fourth ventricle. Dilatation of the lateral and third ventricles results (Fig. 5). The lesion itself is destructive rather than expanding, and hence large tuberculomata above the tentorium may give rise to only slight signs of raised intracranial pressure.

There is very commonly evidence of tuberculosis elsewhere. The lungs may be affected, the spine, the reproductive organs and the suprarenals. Fever is common, ranging from 99° to 101°, usually a slight evening rise.

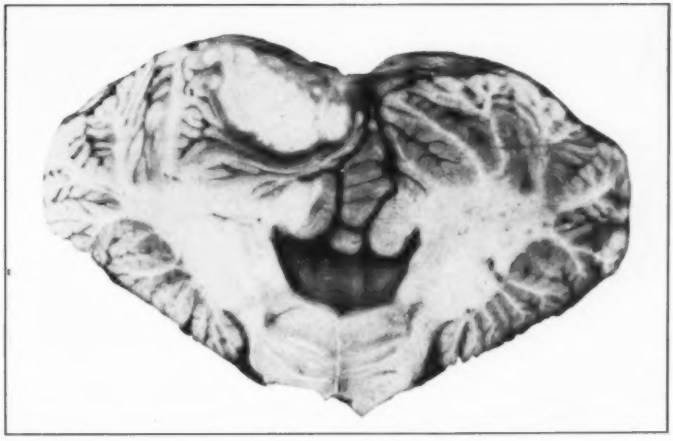

FIG. 1.—CIRCUMSCRIBED TUBERCULOMA OF THE BRAIN IN A CHILD AGED SIX.
The child suffered from pulmonary tuberculosis and renal tuberculosis.

FIG. 2.—TUBERCULOMA REMOVED FROM LEFT LOBE OF CEREBELLUM.
Its size can be seen in comparison with the rule below.

FIG. 3.—TUBERCULOMAS ATTACHED TO THE UNDER SURFACE OF THE TENTORIUM IN A CHILD AGED TEN.
A large tuberculoma had been removed two months previously and the child died of miliary tuberculosis.

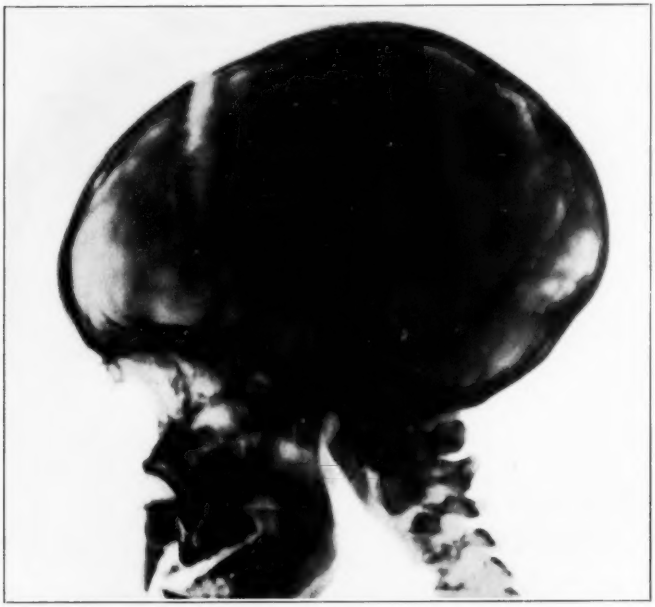

FIG. 4.—SKIAGRAM OF A GIRL AGED TEN WITH A TUBERCULOMA OF THE CEREBELLUM.
The increased intracranial pressure is producing separation of the cranial sutures.

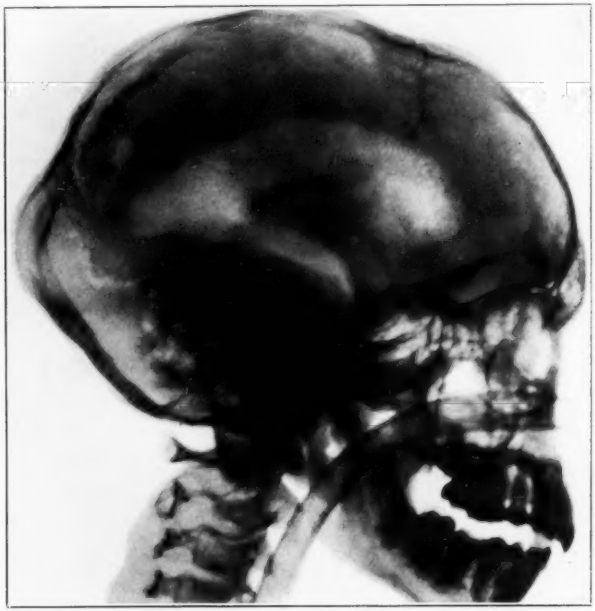

FIG. 5.—DILATED VENTRICLES IN A CASE OF TUBERCULOMA OF THE CEREBELLUM IN A MAN AGED SEVENTEEN.
The tuberculoma was successfully removed.

The actual tuberculoma may be secondary to a tuberculous lesion in the cervical spine or in the middle ear or sinuses.

2. *Tuberculoma "en plaque"* is a very rare condition. The meninges are the seat of a chronic tuberculous infection. It is usually extensive, covering one or more hemispheres. The lesion is caseous in nature, with the usual microscopical appearances. Headache is very marked and fits of a Jacksonian type extremely common.

The prognosis is very grave and no operative treatment is of any avail.

Symptomatology.

The symptoms occasioned by a tuberculoma of the brain are very varied and depend on the site of the lesion. The signs produced may be divided into focal, local and general.

The *focal signs* are produced by the lesion itself. The tuberculoma is commonly situated in the cerebellum, and gives rise to cerebellar signs which consist of a combination of the following.

Nystagmus is common. It is usually present on lateral movement of the eyes. The nystagmus is slow to the side of the lesion and rapid to the opposite side.

The head is held with the occiput towards the shoulder of the affected side, the eyes looking away from the side of the lesion.

Tremor is common. It is of two types—a constant static tremor which occurs apart from movement, and an intention tremor which, as its name suggests, increases as the finger approaches the object which it is attempting to touch.

If the hands are held in front of the patient with the eyes shut, the hand on the affected side tends to fall away.

Barany's past-pointing test may be positive. There is lack of tone, generalised, but specially marked on the side of the lesion. The deep reflexes are diminished. There is difficulty in the performance of fine movements, either in rotation of the hands, or in manipulation of the fingers—termed "adiadochokinesia."

There is unsteadiness in the gait, with a tendency to swerve and fall to the side of the lesion. If the lesion is in the mid-line of the cerebellum, then the patient tends to fall forward or backward—commonly backward.

Speech is also affected, being staccato in type.

With a supratentorial lesion the signs correspond with the site of the lesion—thus a tuberculoma in the parietal region will give rise to loss of sensation, astereognosis and, occasionally, fits on the opposite side of the body.

The *local signs* are the signs due to raised intracranial pressure. Headache is a common feature and vomiting also. The tumour is destructive rather than expanding, but with subtentorial lesions the aqueduct is readily pressed upon and internal hydrocephalus results. In these cases the headache and vomiting are severe and associated eye palsies may occur. The discs are choked and show the changes of papilloedema. In a child the sutures of the skull tend to separate and the fontanelles may bulge.

The General Signs.—There is commonly fever of a mild degree, a temperature of 100·5° in the evenings, sweating may be profuse and loss of weight may occur.

There are usually the signs of tuberculosis elsewhere, commonly in the lungs, but also surgical tuberculosis may be seen—for example, in the bones, joints, reproductive organs. In any case the lungs should be X-rayed.

Investigations.

An X-ray of the skull should always be done. This will sometimes show calcification in the tuberculoma itself. Alternatively, the signs of hydrocephalus may be seen, with separation of the sutures (Fig. 4), bulging of the fontanelles and erosion of the clinoid processes, with patchy rarefaction of the bones of the vault of the skull—a " silver-beaten " effect.

Examination of the cerebro-spinal fluid will show the fluid to be under pressure and a lymphocytosis may be present.

A complete blood count is not usually of any material assistance, as there is no characteristic change associated with a tuberculoma of the brain.

A Mantoux test may be of value. A negative Mantoux to 1/1,000 is almost conclusive evidence that the patient has no tuberculoma; a positive reaction is of no significance.

A Wassermann reaction should be done as a routine to exclude the possibility of a gumma.

Treatment.

The treatment of tuberculomas of the brain should be conservative, and although in a few cases the granuloma may be removed entirely, yet in the majority of cases tuberculous meningitis occurs as a complication and ends the scene. In those cases where a successful removal is accomplished, it too often happens that the patient dies at a later date from tuberculosis elsewhere, or from miliary tuberculosis. It is because of this fact that surgical treatment should consist of a simple decompression followed at a later date by heliotherapy. I have seen several children

with obvious tuberculomas of the cerebellum clear up remarkably after such treatment.

Surgical treatment is indicated only where signs of intracranial pressure are present, and it is essential to save the eyesight of the patient by a decompression.

PRIMARY TUBERCULOSIS OF THE LUNG IN CHILDREN*

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The primary infection of the lung in childhood by the tubercle bacillus does not commonly give rise to any symptoms or signs, and the lesion produced passes from the first stage of initial reaction to the invading organism, through the healing process of resolution and organisation, to the final healed lesion without showing any evidence of its existence, except in the X-ray film. It is the complications and accidents occurring during the initial and healing stages which give rise to signs and symptoms and, in some cases, to death. Consequently, the picture produced by post-mortem examinations of the fatal cases or by clinical investigations of a sick child is apt to give a distorted picture of primary tuberculous lesions in childhood. It is only possible to study the pathology of simple primary lesions, therefore, in children who have died from some other cause.

In 1932 Blacklock[1] described the primary tuberculous lesions found in 1,800 consecutive autopsies performed on children. He was able from his findings to give a description of the pathological changes occurring during the initial stage and throughout the healing of such lesions. The earliest lesion in his series was found in a child aged seven weeks, but other workers have found lesions at a still earlier stage in younger children; Zarff records one in a child of twenty-four days.

The earliest lesion described consisted of a localised broncho-pneumonic area in which the alveolar walls were swollen, the alveolar spaces containing fibrino-cellular exudate in which were many tubercle bacilli. Later there was evidence of necrosis and caseation in the pneumonic area with softening at the centre. At the periphery of the lesion tubercles with giant-cell

* The expenses of this investigation were defrayed by a grant from the Halley Stewart Trust.

formation were found. Many tubercle bacilli were seen at this stage in the lesion and in the lymph glands which drained it. The focus was well demarcated from the surrounding lung, which showed little change. At an early stage there was evidence of fibrous tissue formation at the edge of the lesion, and this increased until a definite fibrous capsule was formed round the central caseating material. Finally, in some of the lesions, calcareous deposits were found in the caseous central portion, in others healing by fibrosis alone had taken place.

The broncho-pulmonary and tracheo-bronchial glands which drained the area showed changes similar to those found in the pulmonary lesions. In many cases the glands were considerably enlarged, and this was especially so in infants. The glandular enlargement will be referred to again later in greater detail, as it is an important feature. In some cases there was fibrous periadenitis around the caseous hilum glands and the adjacent alveoli and bronchioles were collapsed.

The position of the primary focus is of some importance, as it explains the involvement of the pleura. Most of the lesions were found near the surface of the lungs, lying just under the pleura. The overlying pleura was usually involved and localised patches of caseous pleurisy and, later, fibrous thickening with pleural adhesions were found.

Experimental work by H. Burke[3] shows that similar pathological changes occur as the result of primary infection in rabbits. He introduced a measured quantity of a suspension of dried tubercle bacilli into the left lung of a series of rabbits by means of intratracheal injection, thereby infecting each animal to the same extent. The animals were killed at intervals from one day to four years after injection, with the result that a consecutive pathological picture was obtained.

On the second day after infection no macroscopic lesion was found, but histological examination showed an area of non-specific lobular pneumonia such as might be produced by the introduction of foreign materials into the lung. On the fourth day the pneumonic process had receded, but numerous tubercle bacilli were found in intra-alveolar mononuclear cells, and the lymph glands at the hilum showed hypertrophy and hyperplasia. At the end of ten days there was definite evidence of the tuberculous nature of the reaction—viz., the presence of isolated and conglomerate tubercles which showed necrotic changes as early as the seventeenth day. During the next stage the lesions showed changes similar to those found in children—namely, a caseating pneumonic area gradually changing into a capsule of fibrous tissue surrounding a caseous centre. The lesions healed in some cases with deposition of calcareous material in the caseous centre, or in others by fibrosis, but they also healed by resolution and disappeared

entirely, so that they could not be identified in some animals killed between the eighth month and fourth year after infection.

This experimental work of Burke shows that the changes occurring in the lungs of rabbits following the inhalation of tubercle bacilli for the first time are very similar to those known to occur in children. It is therefore probable that the earliest reaction in a child's lung is also similar to that in the rabbit, and is a non-specific reaction which only after an interval develops a typical tuberculous formation. Moreover, it is also probable that primary lesions in children may heal completely, leaving no trace of their existence.

Apart from the description of pathological changes, the great value of Burke's work is the comparison which he made between X-ray appearances of the lungs and the corresponding morbid anatomy at different stages of the lesions. Skiagrams were taken of the rabbits' lungs at intervals until immediately before autopsy. Since the lesions were markedly uniform, it was possible to correlate the skiagrams of those rabbits which were allowed to live for longer periods with the morbid changes found in rabbits which had been killed at intervening intervals after infection. Burke found that there were no abnormal pulmonary shadows in the skiagrams of living rabbits until the tenth day, when a shadow was seen in the left lung which was uniform in density and had an indefinite outline. This corresponded with the lesion showing isolated and conglomerate tubercles. The opacity gradually increased in size up to the first month after infection, its character remaining unchanged, although the pathological condition showed necrotic changes after the seventeenth day. From the first to the third month the shadow became smaller in size, and its homogeneous appearance gave place to some mottling. After the third month many rabbits did not show any radiological abnormality.

Although with children it is not possible to follow pathological abnormalities with the same accuracy as it is in experimental work, and although the actual date of infection cannot be determined, yet it can be shown that the primary lesion in the lung parenchyma has a radiological course similar to that in rabbits and the X-ray findings in children can be roughly correlated with the pathological changes already described. There is, however, one important difference between the lesions found in children and those described in rabbits: the enlargement of the hilum lymph glands appears to be a more important feature in children.

At the Children's Investigation Department at the Brompton Hospital 850 children who have been infected by the tubercle bacillus, as shown by a positive tuberculin test, have been observed over periods extending up to eight years. The majority show no evidence of any pulmonary lesion,

but 202*—*i.e.*, 24 per cent.—show, in the skiagram, opacities which we regard as due to primary tuberculous lesions. The evidence on which this diagnosis is based is:

1. The deposition of calcium in the lung lesion and/or in the corresponding hilum glands.

2. Laboratory evidence of pulmonary tuberculosis—*e.g.*, the presence of tubercle bacilli in the gastric contents, or removal of tuberculous material through the bronchoscope.

None of the children had a positive sputum.

There was one girl whose primary lesion did not heal, but gave rise to a slowly spreading fibroid type of disease in the upper lobe of the right lung. It is significant that she became infected for the first time between thirteen and fifteen years of age, her tuberculin test being negative at thirteen years old and positive at fifteen years old. This reaction of an adolescent to primary infection is interesting, specially when reviewed with the work of Heimbeck,[3] who found that nurses coming to a sanatorium without having previously been infected were more likely to develop pulmonary tuberculosis than nurses who had a positive tuberculin test before beginning work.

With this exception, the primary lesions in this series can be grouped roughly for purposes of description as follows:

(1) *Uncomplicated Primary Lesion.*
- (*a*) Pulmonary lesion predominates.
- (*b*) Glandular lesion predominates.

(2) *Complications.*
- (*a*) Resulting from hilum lymphadenitis:
  - (i) Collapse of part of lung.
  - (ii) Bronchogenic spread of disease.
  - (iii) Hæmatogenous spread of disease.
- (*b*) Pleural involvement.

1. Uncomplicated Primary Lesion

(*a*) *Pulmonary Lesion Predominating.*

All the children in this group were over three years of age with one exception (one and a half years), and most of them were between seven and eight years.

These lesions do not as a rule give rise to any symptoms or abnormal physical signs. Some of the children in whom they were found had

* Eighty-five per cent. of these children were known to have been in contact with cases of open tuberculosis.

PLATE XI

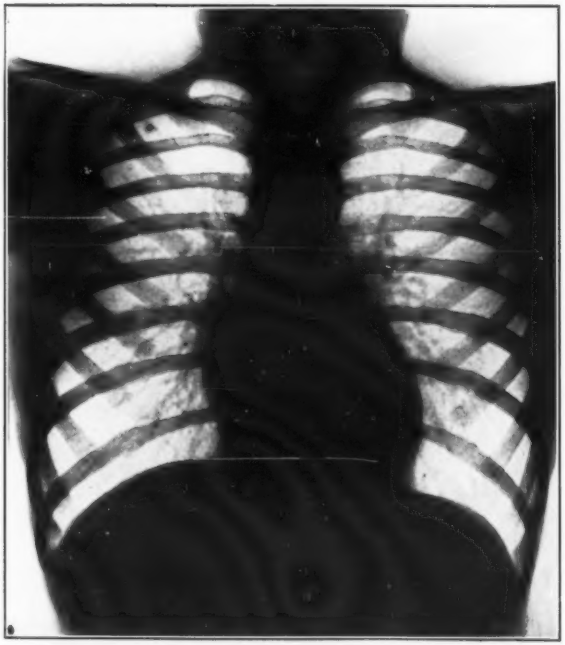

FIG. 1.—TYPICAL CALCIFIED PRIMARY FOCUS AND GLAND.

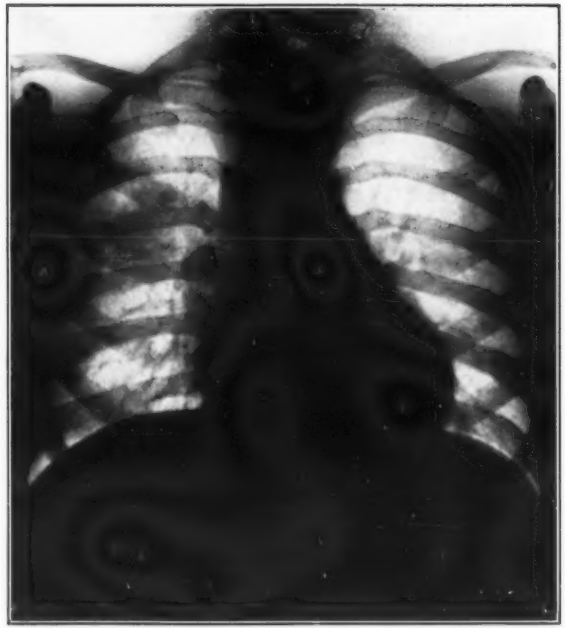

FIG. 2.—E.S.: EARLY PRIMARY LESION, RIGHT LUNG.

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bronchitis, but probably no more than would be found in an unselected group of children attending a hospital for diseases of the chest. There were, however, a few who were definitely below par with anorexia and lassitude, who failed to thrive normally for a long period, sometimes for a few years. These were usually the cases with evidence of a large primary focus in which heavy deposits of calcium were eventually laid down.

The typical X-ray appearance was an opacity in the lung parenchyma varying in size and position in different children. In some it was quite inconspicuous and was overlooked entirely until later radiograms with calcification gave an indication of its position; on reconsideration of the original films the initial lesions were recognised. In others the opacity was obvious, varying in size up to that of a walnut. It was more or less rounded in shape, of a moderate and even density, with an indefinite outline.

In almost all the cases there was an accompanying enlargement of the hilum shadow on the same side. This also varied greatly in degree, the enlargement being, on the whole, greater in the younger children. The size of the pulmonary lesion did not appear to determine the degree of lymphatic enlargement, since in some of those with much glandular involvement the lung lesion was hardly distinguishable.

Subsequent skiagrams during the next three to six months showed a slow but steady decrease in size of the lung opacity, together with an increase in its density and definition. After about six months the decrease in size was less noticeable and there was little change until calcium was deposited. The early stage of calcification was seen either as stippling throughout the lesion or gland, which stippling later increased and became confluent, or else as a central core of calcium which increased in size. The time taken for calcium to appear varied considerably in different cases. This, of course, might be explained by the fact that the actual date of infection can rarely be confirmed, but it does not account entirely for the variation.

A few children did not show calcification until two years after the first lesion was recognised, yet two children had evidence of calcification at the age of ten months, one of whom had no signs of it in a radiogram taken three months before. The same variation in the rate of healing by calcification is noticeable when reports from different countries are compared. Blacklock,[1] in his series of children in Glasgow, found no evidence of macroscopic calcium in primary foci before four years of age, while Continental workers find it in much younger children.

In our series periodical skiagrams showed that the calcium deposits increased in amount in some cases for another one or two years. It is

an important point to bear in mind that sometimes it takes at least four years, and not infrequently two years, for a primary lesion to reach what appears to be a final stage of healing: during this time it cannot be regarded as a truly quiescent lesion. The glandular enlargement gradually decreased, and calcified deposits in the glands appeared more or less concurrently with those in the parenchymatous focus.

The following case illustrates the course of healing of a primary lesion. It has been necessary to choose for illustration an unusually large primary focus because smaller lesions cannot be reproduced satisfactorily in reduced skiagrams.

E. S., a boy of eleven years, came to hospital for treatment of cough and anorexia. There was no history of tuberculosis in the household. He was pale, but his general condition was good; there were no abnormal physical signs apart from a temperature of 99°; the Mantoux test was positive with O.T. 1 : 10,000 dilution. The skiagram (Fig. 2) showed an opacity in the upper part of the mid-zone of the right lung. This opacity, more or less rounded in shape, was homogeneous and had an indefinite outline; the right hilum shadow was only slightly enlarged. The child was admitted to the ward and after a few days all symptoms and signs had disappeared and, to all appearances, he was a normal healthy boy.

The radiological appearances, however, altered more slowly; after one month there was little change, but ten months later the lesion was considerably smaller and its outline well defined (Fig. 3). At this stage the child went away for convalescence and was not seen again for over a year. His clinical condition remained normal during this time. The skiagram two years after the original lesion was found showed some early calcification in the lung focus (Fig. 4). During the following year calcium deposits increased in the lung focus (Fig. 5) and became evident at the hilum. The final calcified lesion was much smaller than the opacity seen during the initial stage.

From a comparison with the work described in the early part of this paper, it can be presumed that the skiagram seen in Fig. 2 corresponds with the pneumonic stage of the lesion; that taken seven months later (Fig. 3) represents the stage with a caseating centre surrounded by a fibrous capsule, and Fig. 5 corresponds to a focus with still further reduction in the caseous centre which is partly replaced by calcium.

Apart from these children who had definite X-ray evidence of a pulmonary lesion in the initial stage, there were many others who developed small deposits of calcification either in the lung tissue or in the hilum glands while under observation but who never had any detectable lesion at the early stage of the disease. Conversely, there were no doubt many

PLATE XII

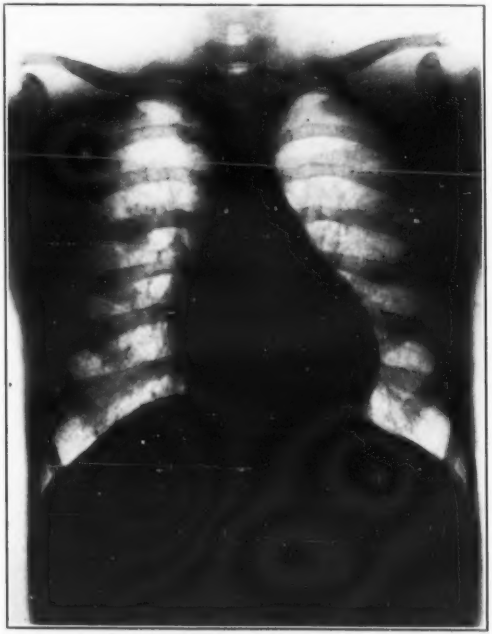

FIG. 3.—E.S.: TEN MONTHS LATER REDUCTION IN SIZE OF LESION AND INCREASED DEFINITION.

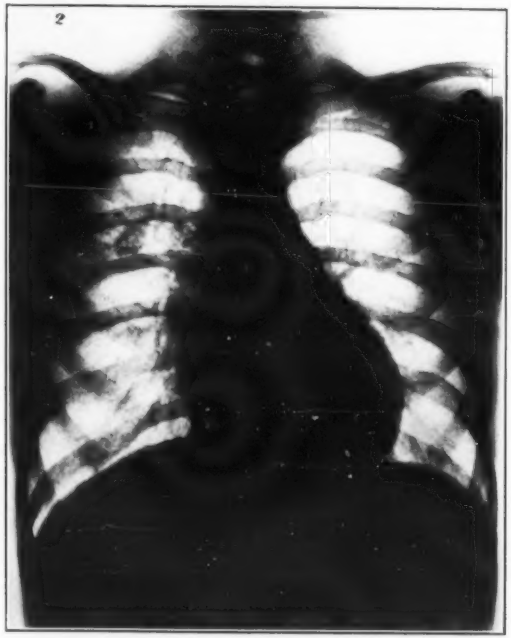

FIG. 4.—E.S.: TWO YEARS AFTER FIG. 1: EARLY CALCIFICATION IN PRIMARY LESION.

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PLATE XIII

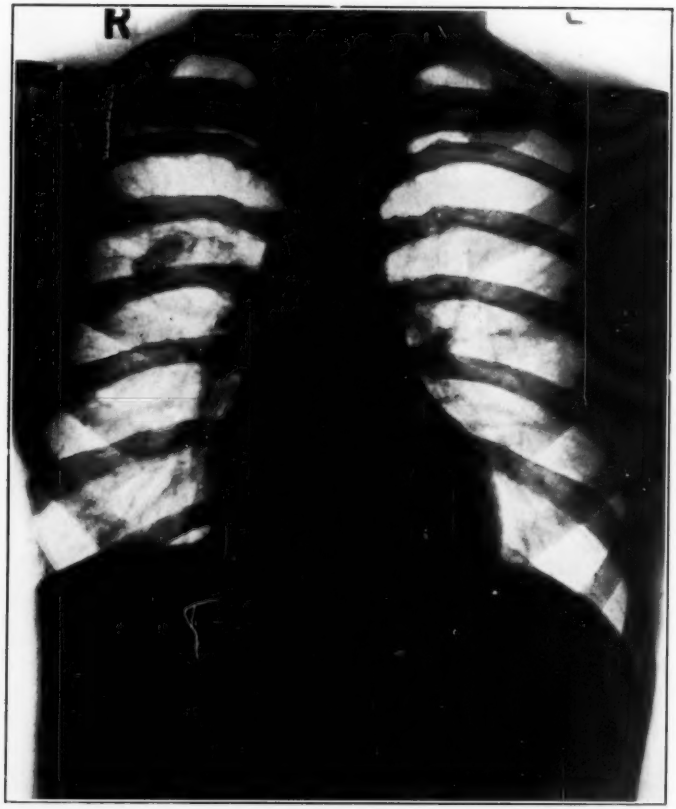

FIG. 5.—E.S.: FOUR YEARS AFTER FIG. 1: INCREASED CALCIFICATION IN PRIMARY FOCUS AND CALCIFICATION AT RIGHT HILUM.

children who had an evident primary lesion at the initial stage, which later healed without calcification, but, because the opacity has no characteristic qualities, the lesion could not be recognised as tuberculous.

The above description therefore cannot be regarded as a comprehensive one, and only includes the recognisable primary lesions whose tuberculous nature is undoubted.

(*b*) *Glandular Lesion Predominating.*

As already stated, pathological evidence shows that glandular enlargement accompanying a primary lung lesion is more extensive in infants and younger children. It is therefore not surprising that this group consists mostly of children of five years of age and under, although there were one or two as old as eight and nine years.

Children with glandular enlargement without complications are usually as free from symptoms and signs as the previous group, and the lesion is generally detected by X-ray examination. Their general condition also remains good throughout with the same exception—namely, a few with evidence of gross lesions with subsequent large deposits of calcium do not thrive normally for a time. The skiagram shows an increase in the hilum shadow which varies in outline; sometimes it has a rounded peripheral border, but sometimes it is of a triangular shape with the apex towards the periphery. In some cases the opacity is in the supra-hilar region due to involvement of the paratracheal glands. It is especially in these cases that there is displacement of the trachea and mediastinum to the opposite side, and it is only by noting the increased width of the mediastinal shadow that the real extent of the glandular enlargement can be appreciated. In others the glandular opacity extends surprisingly far into the region of the lung parenchyma, and probably this is due to periadenitis and collapse of adjacent pulmonary tissue.

An extensive glandular involvement does not necessarily correspond to a large pulmonary focus; in fact, it is more usual to find it accompanying a small lesion which at first may not be easy to find. It is tempting to suppose that in young children only comparatively few of the invading organisms are retained in the lung parenchyma, the majority passing on rapidly to be dealt with by the lymphatic glands.

Healing in the glands is slower than in the lung focus. The glandular opacity gradually decreases in size over a period of twelve to eighteen months. Calcification may be seen within a year, but even when this is so the hilum shadow is usually still far from normal. The amount of calcium in the glands increases for a further one to two years.

The following case illustrates the above description:

G. F., girl aged two years, contact with tuberculous father. She was brought to hospital for examination as a contact and had no symptoms. On examination she had a temperature of 99·2° and scattered rhonchi were heard throughout both lungs. The Mantoux test was positive with O.T. 1 : 1,000. Her general condition was normal. The skiagram (Fig. 6) showed an enlargement of the left hilum shadow of a roughly triangular shape, the apex extending towards the left upper lobe. The trachea was displaced in the supra-hilar region towards the right side. The child was sent away for institutional treatment in the country and returned eight months later. Her general condition was good and there were no abnormal physical signs. The skiagram showed little change, the enlargement of the left hilum shadow was still as evident, but at this time there was also evidence of a small primary lesion in the left upper lobe. Early calcification was found in the primary focus and glands eighteen months after the original lesion (Fig. 7). By this time the hilum shadow was normal in size. During the following year calcification increased in amount and then apparently remained stationary.

(2) Complications of Primary Lesion

It is these cases which have symptoms and signs and, in some cases, a fatal outcome, and it is consequently this group which has been given prominence in medical literature. In all cases the clinical picture is the result of some complication arising during the course of a primary lesion.

(*a*) *Result of Hilum Lymphadenitis.*

The enlargement of the hilum glands and the spread of tuberculous disease into neighbouring structures gives rise to the majority of the complications, and certainly to the most serious ones.

(i) *Pulmonary Collapse.*

The significance of tuberculous enlargement of the glands at the lung roots has been clearly demonstrated by Brock, Cann and Dickinson. They showed how enlarged tuberculous glands may reduce the lumen of the bronchi by pressure, either by altering the angle of the carina and so attenuating the bronchus and reducing its circumference, or by direct pressure into the wall of a bronchus. Both conditions may result in total occlusion of a bronchus and consequent collapse of the corresponding lobe.

This result will also follow erosion of the bronchial wall by a tuberculous gland, causing occlusion of the lumen by tuberculous granulation tissue.

In a number of children of our series clinical evidence of these lesions has been found. Some of the children came for examination as contacts and had no symptoms, others came with symptoms of slight malaise and

PLATE XIV

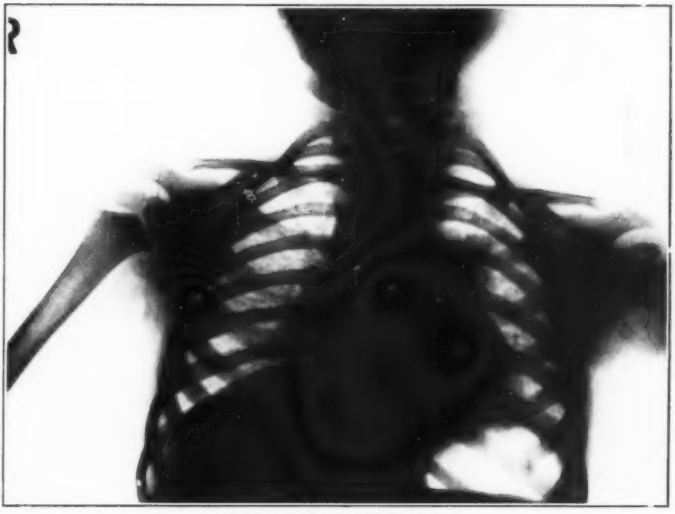

FIG. 6.—G.F.: GLANDULAR INVOLVEMENT WITH PRIMARY TUBERCULOUS INFECTION: TRIANGULAR SHADOW AT LEFT HILUM.

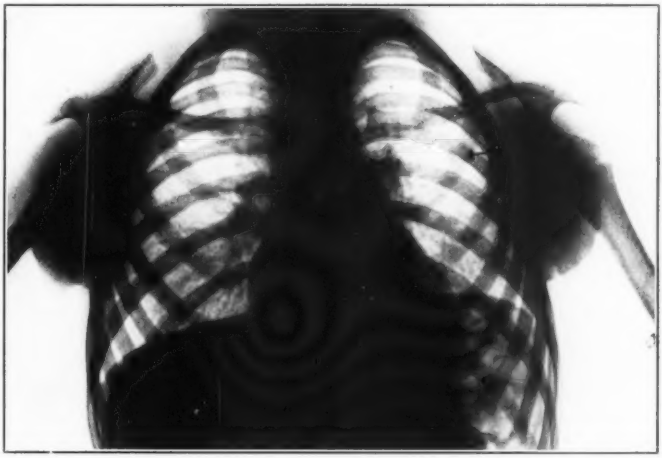

FIG. 7.—G.F.: SEVENTEEN MONTHS LATER—EARLY CALCIFICATION AT LEFT HILUM AND PRIMARY FOCUS BEHIND SECOND RIB, LEFT SIDE.

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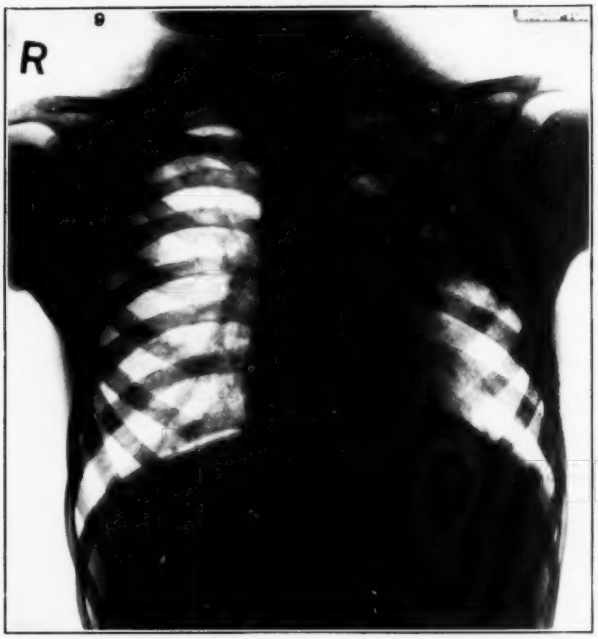

FIG. 8.—R.C.: COLLAPSE OF LEFT UPPER LOBE WITH ENLARGED HILUM GLANDS.

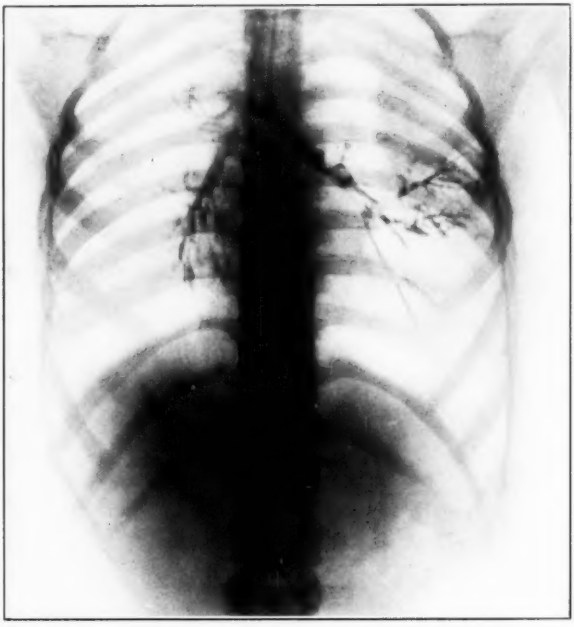

FIG. 9.—R.C.: AFTER LIPIODOL INJECTION, FILLING DEFECT IN LEFT UPPER LOBE BRONCHUS.

cough. The cough was often spasmodic in character and was very similar to whooping-cough. In fact, one child, on admission to the ward, was immediately transferred to a fever hospital in the belief that he was suffering from pertussis. In one case the mother reported that her child, aged two years, " whistled when she breathed." On clinical examination there was often slight fever with an evening temperature of 99° to 100°. The physical signs varied according to the lobe involved. Collapse of the right middle lobe was often not detected on physical examination. When the upper lobe was involved, there was usually impaired movement and percussion note with faint bronchial breathing or else diminished breath sounds over the upper lobe and no adventitious sounds apart from a few rhonchi. When the lower lobe was collapsed, the most usual signs were coarse crepitations and rhonchi at the corresponding base. In some cases there was an impairment of percussion note and alterations in the breath sounds, but this was not often so. Probably the consolidation was masked by compensatory emphysema of the other lobes which is seen to occur in these cases. This also may partly account for the fact that the heart is not always displaced towards the lesion.

Radiological examination including bronchography gave the definite diagnosis of pulmonary collapse.

Collapse of another lobe may follow while the lobe originally affected re-expands. Successive collapse of all three lobes occurred in one child during a period of seven months. In many cases the lobes re-expanded, but in others collapse has persisted and bronchiectatic changes have taken place in them. We have not been able to predict which cases are likely to re-expand and which will remain collapsed.

It has been suggested by Brock, Cann and Dickinson[4] that permanent changes occur only in those cases in which there has been infiltration and destruction of the bronchial wall.

From the small number of cases which we have kept under observation, it appears that persistent collapse of the upper lobe gives rise to fewer symptoms of secondary infection than lower lobe atelectasis, the difference no doubt being accounted for by the freer drainage from the upper lobe bronchi.

In two children of this series the tuberculous nature of the lesion was proved by the removal through the bronchoscope of tuberculous material from the bronchial lumen. Others have since developed calcification in the lung parenchyma and/or the lymph glands.

The following case illustrates collapse due to erosion of a bronchus:

R. C., boy, aged six years. There was no history of household contact. The child was brought to hospital with a history of cough and " heavy

breathing"; on examination his general condition was good; his temperature was 99·4°, and in his chest there was an impaired percussion note over the left upper lobe with distant bronchial breathing. He had a trace of sputum which after several examinations did not reveal tubercle bacilli. His Mantoux test was positive with O.T. 1 : 10,000. The skiagram (Fig. 8) showed an opacity occupying the upper zone of the left lung, extending from the hilum. After introduction of lipiodol (Fig. 9) a filling defect of the left upper lobe bronchus was seen. On bronchoscopy there was a bulging of the lateral wall of the left main bronchus in the region of the upper lobe bronchus, and a nodule of material was seen protruding from the posterior wall of the left main bronchus. This was removed and found, on section, to be tuberculous tissue. The skiagram following bronchoscopy showed re-expansion of the upper lobe and the typical picture of enlarged hilum glands at the left hilum. During the six months that the child was in hospital his general condition was good. The hilum opacity in the skiagram diminished slowly, and now, after two years, he is clinically and radiologically normal.

The description of the clinical and radiological course of this case would serve very well to illustrate the condition described by Eliasberg and Neuland[5] which they named epituberculosis. It is now becoming generally accepted that this condition is due to collapse of an upper lobe caused by enlarged tuberculous glands on the corresponding bronchus. Instead of being regarded as a clinical entity, it now finds its place among the complications of the primary tuberculous complex in children.

(ii) *Bronchitic Spread of Infection : Tuberculous Broncho-pneumonia.*

There is no doubt, from the case described above and from other cases reported, that tuberculous material is found to extend into the lumen of a bronchus from an infected lymph gland. It may therefore be expected that inhalation of tuberculous matter further into the lung will occur and give rise to tuberculous broncho-pneumonia. This has been demonstrated in the autopsy described by Cameron and de Navasquez,[6] in which they found a healing primary focus at the apex of the lung, separated by healthy tissue from a wedge-shaped area of tuberculous broncho-pneumonia, the apex of which corresponded to a bronchus which had been eroded by a caseating hilum gland.

Amongst the children which we have observed there have been no such cases. It is possible that they occur most often in infants, of which we do not see many, or possibly it is not a frequent complication, the bronchial lumen becoming blocked with tuberculous material and secretions and the corresponding lobe collapsing before dissemination takes place.

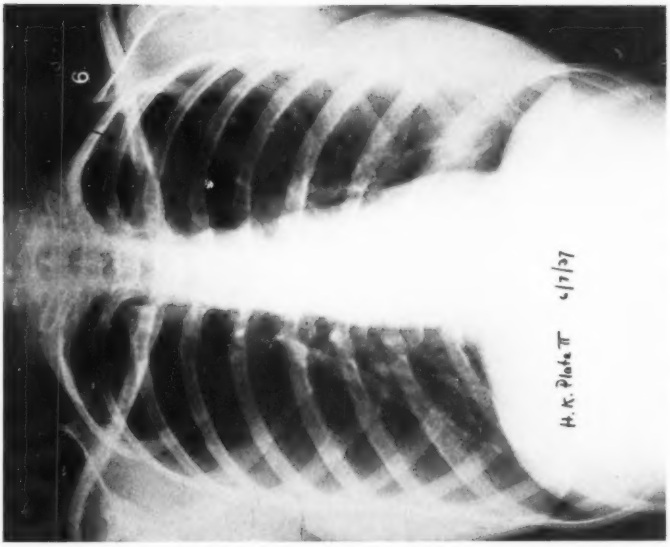

FIG. 2.

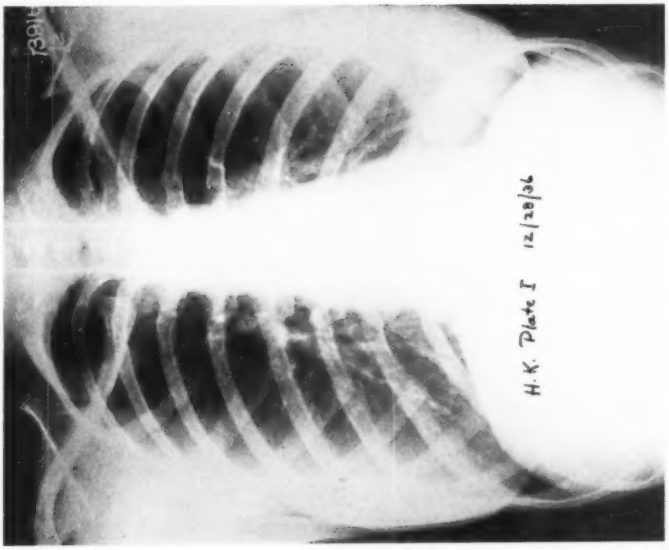

FIG. 1.

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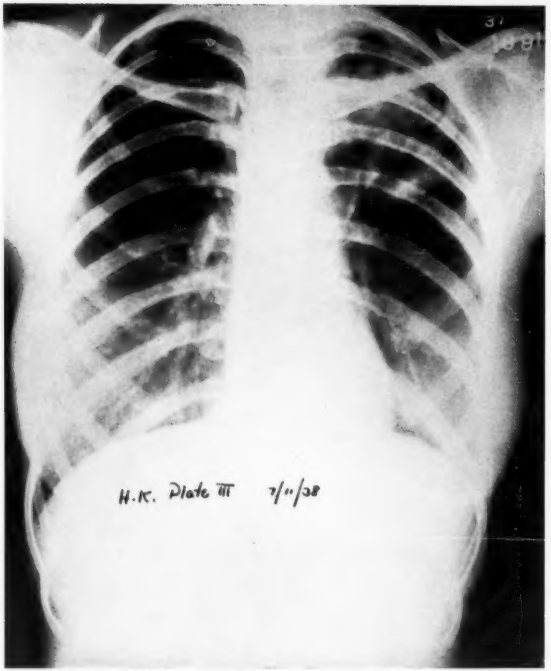

FIG. 3.

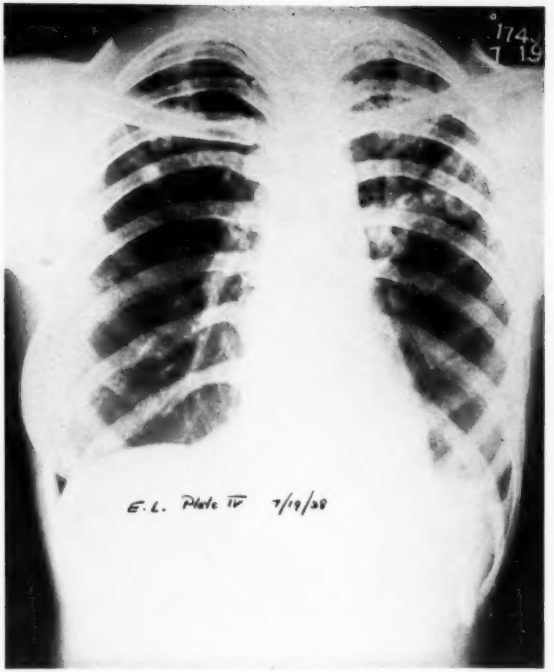

FIG. 4.

(iii) *Hæmatogenous Spread: Miliary Tuberculosis.*

The erosion of the wall of a bloodvessel by caseating lymph glands at the hilum has long been recognised as the starting-point of a hæmatogenous spread with resulting miliary tuberculosis. This also may possibly arise by direct infection of the blood stream via the thoracic duct. The mortality figure for miliary tuberculosis shows clearly that it is primarily a disease of early childhood. A child under one year of age with a positive Mantoux reaction is in grave danger of a miliary spread of the infection. We have, however, seen children who have been infected before twelve months old but who have had no symptoms.

Five of our children with evidence of enlarged hilum glands have developed miliary tuberculosis while under observation. Three of these have died of tuberculous meningitis, one aged four months, and two aged eleven months. The post-mortem examinations of two of them were seen, and a caseating primary lung focus was found in the left lower and left upper lobes respectively, as well as caseating glands at the lung root. There are two children who have developed X-ray evidence of miliary lesions of the lungs which have not been fatal. One, male, aged three years, attended for treatment after discharge from another hospital where he had been treated for pneumonia. He had enlarged glands at the left lung root, a patch of consolidation in the left lower lobe, collapse of the right lower lobe, and mottled shadows of miliary tubercles throughout both lungs. After two and a half years he presents a typical picture of calcifying primary focus in the left lower lobe with calcification at the left hilum and no evidence of miliary lesions. His general development is still below normal.

In the other the miliary lung lesions have been recognised only for one month. The child, aged seven months, had a positive tuberculin reaction but had no symptoms or clinical signs of disease. Radiologically there was enlargement of the left hilum shadow. Four months later routine X-ray examination showed miliary pulmonary lesions and also evidence of calcification in the left hilum glands. The child at the same time had cervical adenitis with much enlargement of the glands. She has occasional pyrexia, up to 99° and 100°, her general condition is good, and there are no abnormal signs apart from the cervical condition.

From observation of these cases two interesting points arise: firstly, a miliary spread, although sufficient to be recognised radiologically in the lungs, is not always fatal; and, secondly, in all five of the cases described the glandular enlargement was evident on the left side. The figures are too small to give any significance to this finding, and it may not be more than a coincidence that the lesions were left-sided.

(b) Pleural Involvement.

It has already been noted that the primary lesion usually lies near the surface of the lung, and at autopsy involvement of the overlying pleura is frequently found. Among the children in this series small effusions were sometimes seen in the skiagrams, not infrequently in the inter-lobar region. They usually cleared within a few weeks and left no permanent abnormality in the radiogram. One or two, however, have developed calcified lesions in the position of an original localised effusion, the shape and position of the calcification suggesting that the chalky deposit is in the pleura. In all cases the effusions were small and did not give rise to any symptoms or signs.

Discussion and Conclusions.

Consideration of the pathological, clinical and X-ray findings which have been described in this paper shows that, in London children, primary tuberculous infection of the lungs usually takes place without any obvious disturbance in the health of the child. The lesion is often a small one, and resistance to infection is sufficiently good to allow it to heal without interfering with normal health or growth.

The process of healing has been shown to occupy more than one year, and, presumably, during this time the focus is always a potential source of dissemination of the disease. It is probable that the rate of healing increases with improved nourishment and increased sunlight. Therefore in dealing with the welfare of children who are known to have acute or subacute primary lesions, or who have been exposed to much tuberculous infection, these factors should always be borne in mind, and the importance of an adequate supply of milk and butter and of access to fresh air and sunlight should be stressed.

Attempts to encourage healing are still more important in those children who have gross hilar adenitis. This condition may give rise to acute miliary tuberculosis, and the only possible method of treatment is the indirect one of increasing the general resistance, thereby hoping to prevent further active disease. This is also the only method to be adopted if an enlarged gland occludes the bronchus by pressure. Since glandular involvement, and the grave complications arising from it, are greater in young children and infants, children of hospital class under two years of age who have evidence of gross tuberculous adenitis should have institutional treatment. This ensures that the children have rest and adequate nourishment and fresh air, and, being under supervision, any intercurrent infections can be dealt with and the resistance of the individual to tuberculous infection maintained. In fact, the general treatment should be

along the same lines as that for tuberculous lesions of cervical glands, peritoneum, or of bones or joints. As tubercle bacilli are rarely, if ever, found in the sputum, there is no reason why children with mediastinal adenitis should not be treated side by side with cases of surgical tuberculosis.

If the occlusion of the bronchus is due to tuberculous material in the lumen, removal of this by bronchoscopy will be followed by re-expansion of the lung, but the risk of dissemination of tuberculous material into other parts of the lung must be considered before advocating this treatment.

So far records of these cases are comparatively scarce, but with further recognition of this condition and its etiology, and especially with more knowledge of the ultimate outcome of the lesions, it will be easier to judge whether or not active local treatment is called for.

Even in those cases in which, apparently, healing has taken place and the child is left with a calcified nodule, we do not know whether the healing process is really complete or whether there may not be some small focus of dormant disease remaining.

There appears to be little known about the ultimate fate of the calcified lesions. Do they remain unchanged throughout adult life, or does the calcium in time disappear? What relation has the calcified primary focus to tuberculous lesions developing in adult life? Is it a protection against future tuberculosis, or is it a possible source of trouble in later life?

With increasing facilities for observation of families of tuberculous patients throughout childhood and adolescence to early adult life, it should be possible in time to throw more light on these problems.

I wish to thank the members of the Honorary Staff at Brompton Hospital for permission to use their cases and for their valuable interest in the work.

I am also indebted to Miss Marx for her help in following up the cases.

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SOME POINTS IN OXYGEN THERAPY

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A PATIENT's life is in danger if his tissues are starved of oxygen, and no organ or cell in the body can long function efficiently or indeed survive without it. Anoxæmia may, broadly speaking, arise in three ways. If oxygenation of the blood in the lungs is incomplete, we speak of anoxic anoxæmia. This is commonly the result of shallow respiratory movements and the presence of alveolar exudate or œdema interfering with the gaseous interchange at the pulmonary capillary bed. If circulatory slowing is the chief cause, stagnant anoxæmia is said to be present, and in this case a vicious circle is often established by the impoverished oxygenation of the cardiac muscle itself. Lack of the oxygen-carrying agent produces anæmic anoxæmia. Generally speaking, anoxic and stagnant anoxæmia (which are often interconnected) are benefited by oxygen treatment, whilst it is unsuitable for anæmic anoxæmia—except in the form due to carbon monoxide poisoning. Oxygen administration, efficiently carried out, removes the cyanosis of patients suffering from anoxic and stagnant anoxæmia, and they quickly feel more comfortable. They remain dyspnœic, because factors other than anoxæmia cause the dyspnœa. The clinical disappearance of cyanosis is the best index of benefit; the pulse rate also is a good guide, tending to fall to normal as the patient improves.

The indications for the use of oxygen in sanatorium practice would seem to be:

1. In the immediate post-operative period following some form of surgical collapse. This may be the most important indication.

2. To tide patients over an acute phase of their illness, or over an intercurrent non-specific respiratory illness such as an attack of acute bronchitis or pneumonia complicating their disease.

3. Possibly, along with other measures, it should be used in spontaneous pneumothorax.

One general principle can be laid down for all these conditions—that if oxygen is used its administration should be continuous. In the type of case envisaged the anoxæmia has arisen suddenly, and that is chiefly why it is productive of distress to the patient and why it is a source of danger. Compensation for oxygen lack may be, to some extent, established in

PLATE XVI

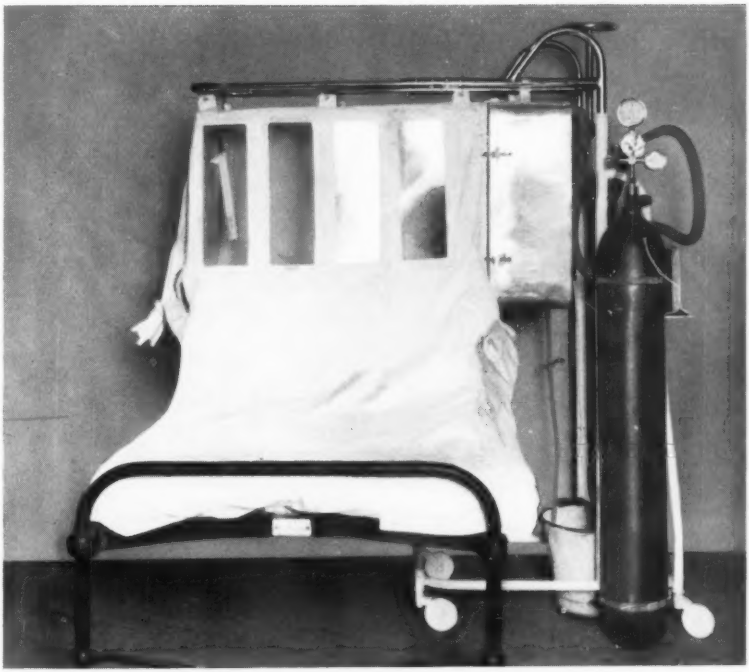

FIG. 1.—THE TENT ASSEMBLED READY FOR USE.

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PLATE XVII

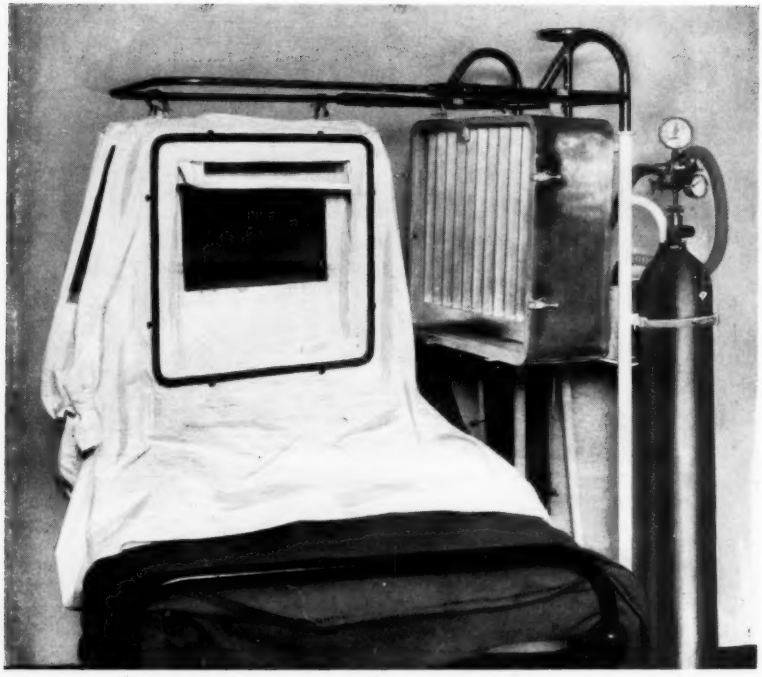

FIG. 2.—THE TENT WITH THE HOOD DETACHED, SHOWING THE COOLING UNIT AND HOOD SEPARATE.

conditions in which anoxæmia is of gradual development. When, however, it develops rapidly and, as is frequently the case, there is an added toxæmia, it is a serious menace to the patient's chances of recovery. Once anoxæmia has been improved it is harmful to allow the patient suddenly to develop it again, and until the cause of the anoxæmia has been disposed of oxygen should be given continuously.

Efficient ways of giving oxygen continuously are:

1. Oxygen tents.
2. Certain forms of face apparatus.

1. Oxygen Tents.

The patient is enclosed in an airtight tent into which oxygen flows. By means of a special " injector " screwed on the head of the cylinder, air is drawn out of the tent and passed through soda-lime to rid it of its carbon dioxide before it is returned along with the fresh oxygen from the cylinder. The injector can be by-passed, making it possible to raise the oxygen percentage very rapidly when necessary.

A cooling device must also be incorporated. In the tent depicted a fluted metal tank containing ice and water and presenting a large surface for the condensation of moisture forms one of the side walls. In other models the oxygen is passed through a coil of tubing immersed in ice. A wet and dry bulb thermometer is hung inside the tent here illustrated, from which the humidity is calculated. There is seldom any difficulty in keeping this at the desired level. Periodic analyses of the tent air have to be made to ensure that the oxygen percentage remains around the level which is adjudged best for the patient—generally between 40 and 60 per cent.—and that there is no accumulation of carbon dioxide.

The best form of initiation into the use of a tent is a practical demonstration. Modern tents, such as the Guy's Hospital pattern, provide a very efficient method of oxygen administration. The more airtight the tent the safer it is and the less oxygen it needs.

Tents have certain drawbacks. Some patients are intolerant of them and dislike the feeling of being enclosed. Whatever method be chosen, there will be some patients who object to it, but this number can be greatly reduced by preliminary explanation, and the attitude of the sisters and nurses is all-important. An attitude of pity for the patient because he is " shut up in the tent " is to be deplored. Running a tent involves a good deal of work, and analytical methods have to be mastered. Feeding and nursing necessitate opening the tent at one of the sleeves, and a general opening up once or twice during the day is sometimes unavoidable.

2. Oxygen Administration by Face Apparatus Methods.

In a tent the atmosphere which the patient breathes is enriched with oxygen so that his alveolar oxygen percentage is increased to, say, 40 or 50 per cent. With methods employing some sort of face apparatus there is a direct relationship between the rate of flow of the oxygen and its percentage in the alveolar air. For efficient administration it is, therefore, imperative that the rate of flow shall be accurately measured, and the use of a reliable flowmeter is indispensable in all face apparatus methods. Further, the apparatus must be secure and sufficiently comfortable to permit of its being worn, if necessary, for several consecutive days. Examples of obsolete and inefficient methods are the funnel waved in front of the patient's nose, and the nasal (or urethral) catheter pushed just inside one nostril and used with a slow and unmeasured rate of flow.

Efficient methods are:

(*a*) The forked nasal tube (Davies and Gilchrist).

(*b*) The face tent or box mask (Argyll Campbell).

(*c*) The nasal tubes fixed to the spectacle-frame carrier (Marriott and Robson, Tudor-Edwards).

(*d*) The nasal mask (Christie).

In case of access to the patient during oxygen administration these methods have certain advantages over the tent, but some patients will not tolerate apparatus worn on the face or tubes in the nostrils. No analysis is required, and administration by any of these methods is undoubtedly simpler than in the case of the tent. These methods differ from each other in respect of the actual apparatus worn on the face. They have in common that they are only reliable and effective when oxygen is given in measured and adequate amounts. The difference between them in running costs is not great.

When all are so efficient, comparison appears invidious, but the forked nasal tube and the nasal tubes attached to the spectacle frame do seem to possess certain advantages over the others. For general use, my personal preference is for the spectacle frame. This has the great merit of security. The oxygen is introduced into the posterior nares by tubes lying well into the back of both nostrils, and there is very little chance of interruption of oxygen flow due to the tubes slipping out of place. On the other hand, the Davies-Gilchrist tube, projecting as it does just inside the nostrils, avoids irritation of the nasal mucosa but to some extent sacrifices security.

PLATE XVIII

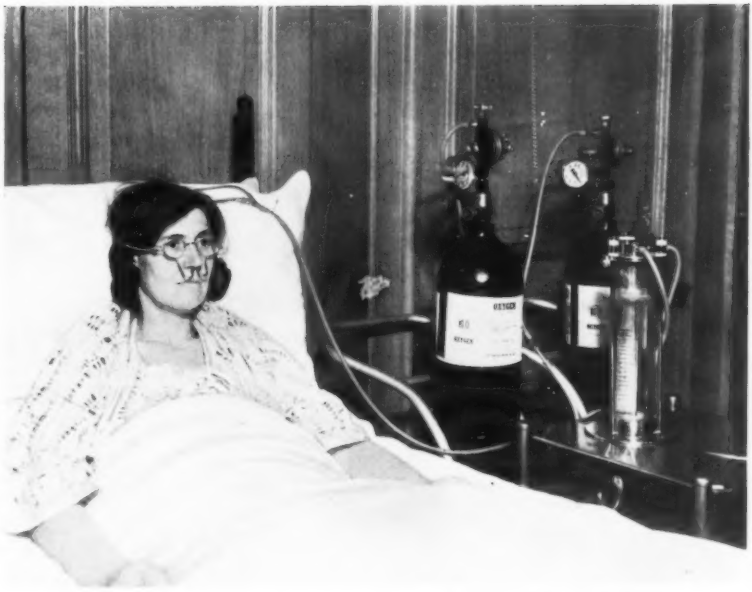

FIG. 3.—THE DOUBLE NASAL TUBES AND SPECTACLE-FRAME METHOD.
Note the large cylinders, also the flowmeter and humidifier combined.

[*To face page* 94

The Nasal Tubes.

The tubes attached to the spectacle-frame holder are 3½-inch lengths of Dunlop cycle valve tubing. Before inserting these tubes they should be lubricated with liquid paraffin and the patient's nose should be anæsthetised. This is conveniently done with a De Vilbiss spray, using a freshly prepared 5 per cent. cocaine solution containing 1/1,000 adrenalin 1 part in 20. For any method in which the oxygen is introduced right into the nostril it must be moistened. Otherwise it has a drying effect on the nasal mucosa and produces intolerable discomfort in a short time. The flowmeter illustrated acts also as a humidifier.

The accompanying graph shows the effectiveness of this method at different rates of oxygen flow. Mouth-breathing and rapid respiratory

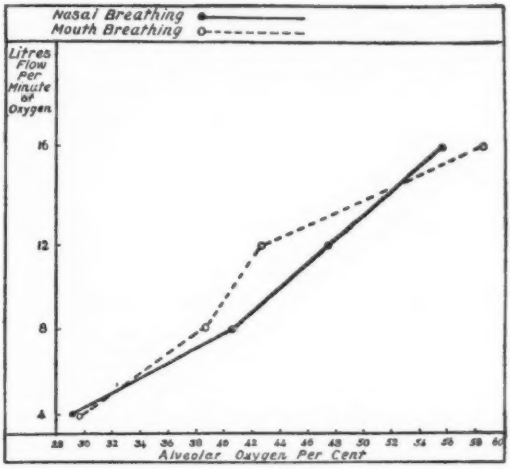

FIG. 4.—GRAPH SHOWING THE RESULTS OBTAINED WITH THE DOUBLE NASAL TUBES.*
The carbon dioxide concentration of the samples varied between 4·8 and 5·8 per cent., indicating that deep alveolar air was being obtained.

rates make little difference. The rate of flow recommended for ordinary purposes is 6 to 8 litres per minute.

The size of cylinder used is of great importance. Small cylinders become quickly exhausted, and cylinders of 100 cubic feet capacity should be used. They are now readily obtainable. At a flow of 8 litres per minute a 100-cubic-foot cylinder will last about six hours. The cylinder

* I am indebted to the *British Medical Journal* for permission to reproduce this figure, and for the loan of the block.

should be fitted with a pressure regulator, and pressure tubing should be used for the rubber connections.

Further information about the tent and other apparatus can be obtained from Oxygen Tent Service (Medical Equipment), Ltd., 33, Devonshire Street, W. 1, or from Messrs. A. Charles King, 34, Devonshire Street, W. 1, who manufacture the spectacle-frame tube carrier.

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PULMONARY TUBERCULOSIS FOLLOWING *SERO-FIBRINOUS PLEURISY**

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A REVIEW of the literature and personal observations reveal that modern treatment of sero-fibrinous pleurisy leaves much to be desired. The reference is, of course, to the acute pleurisy with effusion uncomplicated by lung lesions; this disease should be considered of tuberculous origin in nearly every case, and, like pulmonary tuberculosis, the majority of these cases occur in youth and early maturity. In a typical instance the patient is acutely ill for several weeks or a month or two, but almost always recovers his health, at least temporarily, upon the absorption of the fluid. The effusion may be very small or fill the entire chest. It has the characteristics of an exudate, with a predominance of monocytes microscopically. The fluid may give a positive guinea-pig test, but often does not, as in two cases described below. It is safe to conclude that an effusion occurring acutely in a young individual who has been previously well, and which cannot be attributed to pneumonia, infarct, rheumatic fever, blood dyscrasias such as leukæmia, pleural metastases, the congestion of heart disease or the transudation in kidney disease, is undoubtedly due to tuberculosis regardless as to whether tubercle bacilli are found in the fluid or not.

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Tuberculosis of the pleura is usually secondary to disease of the lungs or to tuberculosis of mediastinal lymph nodes or caries of the ribs, etc. (W. S. Miller,[1] Kaufmann[2]), though in the cases under discussion pulmonary lesions are never immediately evident roentgenographically even after the fluid is absorbed. The tuberculous process may have reached the pleura from a minute non-progressive focus in the lung by lymphogenous or hæmatogenous routes or by direct extension. The appearance of tubercles in the pleura is followed by exudation into the pleural cavity and by proliferation on the pleural surfaces, the end result being cicatrisation, adhesion formation and pleural synthesis.

Up to about twenty-five years ago discussion of treatment of these cases of so-called idiopathic pleurisy centred around the illness with little or no emphasis on after-treatment. Thus, Reisman's[3] chief concern was a question of frequent chest taps during the acute phase or in the use of auto-serotherapy (subsequently developed by Fishberg).[4] Incidentally, Kallner,[5] in a recent careful follow-up study of more than 600 cases of sero-fibrinous pleurisy, pointed out that draining the exudate or leaving it alone has no appreciable effect in preventing subsequent manifestations of pulmonary tuberculosis.

Modern writers stress the importance of after-care to prevent later lung changes, but the recommendations made are in many instances not clear. Meakins[6] simply stated that the general régime for a tuberculous infection should be followed upon absorption of the fluid. Osler,[7] after stating that the majority of cases of effusion are tuberculous, said that the after-treatment is important, and that the patient should be handled exactly as if he had an early tuberculous process in his lungs. Fishberg[8] was more specific, and advocated a period of sanatorium care as necessary for these cases, with careful observation for at least five years. Gaarde,[9] who studied the subsequent records of 126 cases of effusion over a nine-year period, concluded that the prognosis as to future health is more favourable when prolonged rest of four months or more is given; while Miller[10] insisted that six months' routine rest should be the minimum for these cases. Confidence in this accepted mode of therapy has just received a rude setback, however, in a recent careful clinical study of the problem. Kallner[5] analysed 690 cases of idiopathic pleurisy, 85 per cent. of which were available for after-examination one to twenty years later, and he concluded that no great importance could be ascribed to sanatorium care, as heretofore given, for preventing the occurrence of subsequent pulmonary tuberculosis—at least as many of those who received sanatorium care subsequently developed pulmonary tuberculosis as of those who had no after-treatment.

It is probable that the gravity of the problem of the development of

pulmonary tuberculosis following pleurisy has not been keenly appreciated. Allard and Koster,[11] who were the first to study this problem carefully, gave a subsequent pulmonary tuberculosis morbidity of 47·7 per cent.; but their figures are undoubtedly too high, as their conclusions were based on physical signs and symptoms alone, so that there may well have been undetected pulmonary lesions at the outset. Stiassnié[12] reported that 22·5 per cent. of ninety-three patients developed tuberculosis of the lungs subsequent to pleurisy. Three of the cases developed this complication while under sanatorium care immediately after their acute illness and after the fluid had absorbed. Gaarde[9] found that only 57·9 per cent. of his pleurisy cases were well after nine years' observation. Borelius[13] found a tuberculosis morbidity of 39·8 per cent., and Kallner,[5] in his recent excellent series, reported a pulmonary tuberculosis morbidity of 39 per cent. The latter also pointed out, in confirmation of previous statistics, that 80 per cent. of those who develop pulmonary tuberculosis have this complication five years after the acute pleurisy, and that about 50 per cent. who develop this complication do so within two years of the effusion.

Though it thus appears that the chief danger period after pleurisy is the five years immediately thereafter, two of our cases developed pulmonary tuberculosis seven years after the effusion, and in Kallner's series this complication was also noted eleven, twelve, fourteen and sixteen years later. It is interesting to note, too, that the mortality from the later pulmonary disease is 20 to 25 per cent. according to most writers.

Looking at the problem from another angle, Kallner points out that of 605 cases of pulmonary tuberculosis treated at his hospital, 19 per cent. had pleurisy before pulmonary tuberculosis developed; while Fishberg in his book concluded, from a compilation of statistics, that between one-third and one-half of patients receiving treatment for pulmonary tuberculosis had had pleurisy before the onset of symptoms referable to their lungs.

It would appear from the foregoing that present concepts of after-treatment of so-called idiopathic pleurisy may have to be changed to prevent in future the needlessly high tuberculous morbidity now obtaining. A clearer idea of the problem involved may be obtained by the four following cases that have recently been seen:

1. H. K., white, age twenty. No family or contact history of tuberculosis. In-patient at Presbyterian Hospital from October 21, 1935, to November 15, 1935, for acute left pleurisy with effusion, the fluid reaching almost to apex. A typical serous exudate was tapped the day after admission. The fluid had a specific gravity of 1019, and showed a cell count of 930 per c.mm., with monocytes 98 per cent. and polymorphs 2 per cent. The fluid was negative for tubercle bacilli on smear, and *guinea-pig inoculation was negative for tuberculosis.* A high intermittent temperature for a week

(102° to 104°) slowly returned to normal at the end of the second week, and she was discharged free from symptoms after a three and a half weeks' stay in the hospital. Shortly thereafter the patient entered Ray Brook Sanatorium, where she remained six months. Two chest X-rays taken there were negative. The subsequent clinic visits were as follows:

November 2, 1936.—Had gained 22 pounds since discharge from hospital. Asymptomatic. No abnormal physical signs.

December 28, 1936.—X-ray of lungs, taken because of persistent cough, was negative (Fig. 1).

June 7, 1937.—Gradual loss of 10 pounds weight for seven months. No pulmonary symptoms or signs, however, but because of high pulse rate (116) and weight loss, possibility of Graves' disease was borne in mind. X-ray taken shows small nodule under junction of clavicle and first rib on left side which was apparently overlooked at the time (Fig. 2).

June 28, 1937.—No respiratory symptoms. No abnormal physical signs. Felt well but had lost an additional 3 pounds. Pulse rate 110. Temperature normal.

October 11, 1937.—Regained 2 pounds. Felt and looked better but a little nervous, due to a train wreck which shook her up. Examination negative.

April 11, 1938.—"Never felt better in her life." Examination negative. Gained an additional 3 pounds.

June 11, 1938.—Coughing past three weeks — sputum was blood-streaked last night. Lost 6 pounds since last visit. Temperature normal. Pulse 114. Examination of chest shows transient rales left apex.

July 11, 1938.—X-ray—diffuse infiltrative process left upper lobe above second interspace anteriorly with irregular honeycombing. Right side is clear (Fig. 3). Sputum, T.B. present. Sent to hospital.

Comment.—This case has been described at length to show the insidiousness with which pulmonary tuberculosis develops after pleurisy in spite of apparently good early after-care. The paucity of respiratory and constitutional symptoms when this complication develops are also worth noting. Other interesting points are that the early pulmonary lesion in this patient was overlooked for a year before the diagnosis of pulmonary tuberculosis was actually made, and that the guinea-pig test of the pleural fluid was negative though the subsequent course proved its tuberculous nature.

2. E. I. L., negress, age twenty-seven.

August 19, 1937.—Admitted to Harlem Hospital for pleurisy with effusion. X-ray taken August 5, 1937, had shown fluid in left side extending up to second rib anteriorly. She was tapped once, and fluid was reported negative for tuberculosis. She improved under treatment and was discharged twelve days later at her own request, having no respiratory symptoms or abnormal pulmonary signs. She was well and returned to work about a month after discharge from the hospital. There had been no family or contact history of pulmonary tuberculosis.

July 19, 1938.—Eleven months later she appeared in Vanderbilt Clinic because of cough, expectoration, weakness and loss of weight of six weeks' duration. She had also had pain in the right knee for past three months, and this knee had become swollen in the preceding weeks. X-ray taken (Fig. 4) showed scattered areas of infiltration and cavitation left upper lobe, with a thickened left pleura, and a fine infiltrative process above the second rib on right side. X-ray of right knee suspicious of early tuberculous involvement of that joint.

July 27, 1938.—Sputum showed T.B. present. Patient was promptly admitted to Tuberculosis Hospital.

Comment.—This case exhibits wholly inadequate after-care because patient and physician were convinced that there was no pulmonary lesion at the time she was treated for pleurisy. It is possible that if the patient had been properly warned, and followed up by the health authorities as any ordinary case of pulmonary tuberculosis, she might have been seen a little before the advanced pulmonary lesion developed, when treatment for the complication could have held out greater hope than it does now.

3. T. C., white, female, age 32. This patient's mother died of pulmonary tuberculosis nine years before, and the daughter had nursed her prior to her death. She was an in-patient at the Presbyterian Hospital from April 10 to April 29, 1931, for an attack of acute right pleurisy with effusion. She was tapped three times. Guinea-pig examination of the fluid was negative for tuberculosis. An X-ray taken on April 14, 1931 (Fig. 5), showed fluid at the right base, but both lungs were clear. She was transferred to another hospital at the end of her stay, and then continued to rest at home for six months before returning to work.

Follow-up, March 9, 1932.—During readmission to hospital for pyelitis of pregnancy, X-ray of chest (Fig. 6) was negative for any pulmonary involvement.

July 15, 1932.—Low forceps delivery of healthy child with uneventful convalescence. Had neglected any further medical examinations till August 4, 1938. Health had begun to fail in January, 1938, after an attack of influenza. Had been coughing, feeling weak and gradually losing weight since then. Annoying dyspnœa at rest and on exertion past few months.

On examination, August 4, 1938, she looked acutely and chronically ill, was hoarse, coughing and dyspnœic—temperature 102·6°, pulse 104, weight 64½ lbs. Physical signs and X-ray (Fig. 7) were indicative of a bilateral upper-lobe caseo-cavernous lesion more marked on the right side, where there was a large apical cavity, with fine diffuse pulmonary dissemination as well. She was sent to the Tuberculosis Hospital in a grave condition.

Comment.—This patient went through an attack of pyelitis less than a year after acute pleurisy and an uneventful delivery somewhat later. Frank clinical tuberculosis only appeared about seven years after the effusion, following an attack of supposed influenza.

PLATE XXI

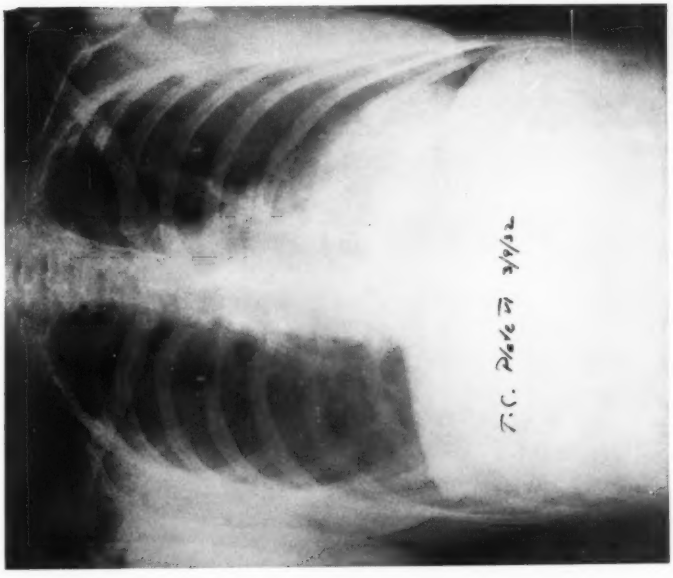

FIG. 6.

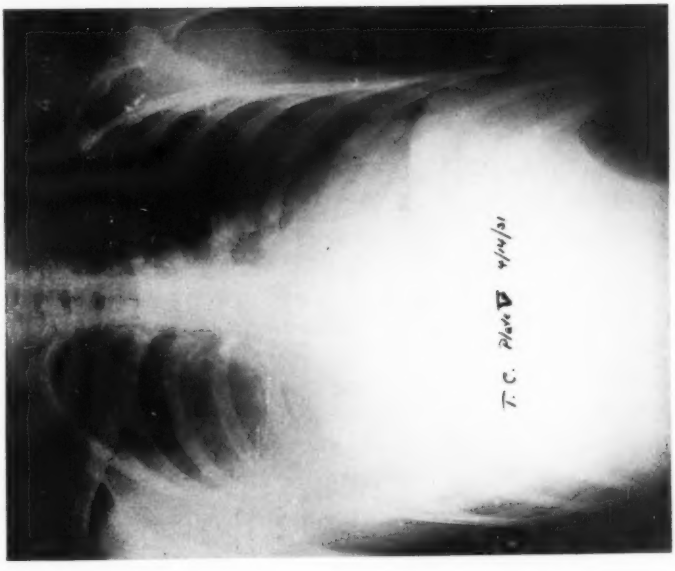

FIG. 5.

[*To face page* 100

PLATE XXII

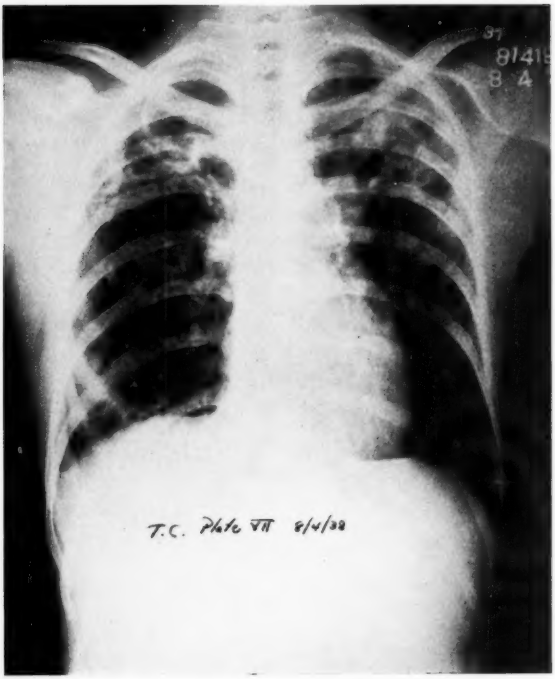

FIG. 7.

4. M. D., white, male, age forty-eight. This patient had a right pleural effusion seven years previously; made an uneventful recovery after a stay in Bellevue Hospital of several weeks, after which he spent three months resting in the country. He was well and able to return to work at the end of that time, until early in January, 1937, an attack of influenza left him with a persistent cough, rapid loss of weight and strength, and occasional blood-spitting. Sputum contained T.B. An X-ray taken on January 20, 1937, showed a diffuse honeycombed exudative lesion in upper two-thirds of the right lung and a small nodule in the left lung at the level of the first rib at its lateral aspect. Physical signs were too scanty to predict the extent of the lesion on either side.

Artificial pneumothorax was attempted in several places on the right side without success, but he improved slowly and the disease became arrested after a year of rest in bed.

Comment.—As in the previous case, it is likely that the acute infection (influenza) lighted up an old small pulmonary focus in the right lung that was quiescent and causing no trouble seven years after an acute pleurisy of the right lung. It is also noteworthy that an attempt at pneumothorax failed here, as it nearly always does, because the previous effusion had led to symphysis of the visceral and parietal pleura on that side.

Pulmonary tuberculosis following an effusion invariably starts on the same side as the previous pleurisy (Stiassnié, Kallner, Fishberg). We can conclude from this observation that small pulmonary lesions are always present at the time of the sero-fibrinous effusion although they cannot be seen roentgenographically after the pleurisy has subsided. In four out of ten cases, within a period of five years, they become active and spread within the same lung, producing manifest evidence of pulmonary tuberculosis.

Fishberg pointed out that acute progressive phthisis is extremely rare following primary pleurisy, but the two cases cited above are examples. Brand and Block[14] found that cases of pulmonary tuberculosis with preceding pleurisy had a poorer prognosis than those without pleurisy in so far as serious sequences of adhesions, fibrosis and right heart failure may ensue. Furthermore, the onset of pulmonary symptoms in patients who develop pulmonary tuberculosis after an effusion is so insidious that many are seen only when the pulmonary lesions are in an advanced stage.

Pulmonary lesions following pleurisy do not appear to extend as rapidly as in those who have not had a previous effusion. In the former cases, too, the patients are much less sick and have fewer respiratory symptoms in proportion to the lung destruction, a feature which contributes to the danger that they may be seen again only when in advanced phthisis unless

a pulmonary hæmorrhage frightens them into seeking medical attention earlier.

Effective artificial pneumothorax in these cases is wellnigh impossible, because dense pleural adhesions are almost always encountered as a result of the previous effusion. The treatment of choice, if the patient's condition warrants, is some more radical form of collapse therapy or prolonged sanatorium care.

If as many as 40 per cent. of cases of "idiopathic" pleurisy later develop an active form of pulmonary tuberculosis that is difficult to treat, it would appear that our after-care of these cases must be radically improved. It is the duty of the phthisiologist to reduce the incidence of future pulmonary complications, but to do so he has to combat the psychology of the patient and the tenor of institutional care available to the patient upon recovery from uncomplicated pleurisy. These patients are reluctant to stay in a sanatorium for the prolonged period advisable, often more than six months. They have no respiratory symptoms and rapidly recover their weight and strength, and then resent staying in an institution where there are open cases of pulmonary tuberculosis, with most of their fellow-patients sick and receiving special treatment. Moreover, once they recover their weight and strength, many of them are put to work in the institution, so that they feel that they might as well do work for pay elsewhere. Finally, although told of the subsequent care required after leaving the sanatorium, these patients are notoriously careless in appearing later for follow-up examinations, whether they cost money or not.

To prevent the future high morbidity from pulmonary tuberculosis in these patients, it is worth while considering the institution of artificial pneumothorax following pleurisy with effusion. This procedure is now considered harmless in good hands. It has recently been highly recommended in very early cases of pulmonary tuberculosis, and since the patients under discussion may be considered as illustrating the quintessence of incipiency of the pulmonary lesion, collapse therapy after uncomplicated pleural effusion may be expected to favour fibrosis of the quiescent lung focus. Continuance of the pneumothorax for at any rate part of the period of greatest danger—up to five years after pleurisy—may thus act as a prophylactic against future active pulmonary tuberculosis. From the psychological standpoint, the use of pneumothorax in these patients will impress upon them the necessity of considering themselves subject to the same rules and regulations that govern after-care for any patient with pulmonary tuberculosis, a consideration which, unfortunately, is not the case today.

Conclusions.

1. The present incidence of pulmonary tuberculosis following sero-fibrinous pleurisy is excessively high.

2. It is not possible, in most instances, for patients recovering from pleurisy to obtain adequate rest and care in a way likely to minimise the risk of later pulmonary complications.

3. Pulmonary tuberculosis developing after pleurisy with effusion is very insidious in its onset and by no means easy to treat.

4. It is suggested that artificial pneumothorax should be instituted on the side affected by the pleurisy and maintained for a number of years if possible, as a means of preventing the subsequent development of phthisis, which almost invariably affects the lung underlying the effusion.

5. Present follow-up of cases of pleurisy is wholly inadequate. They should be observed carefully for at least five years after the cessation of the acute pleural disease; every case should be considered one of potential tuberculosis unless some other cause for the effusion is found, and they should receive the same repeated observations, from the public health standpoint, as a case of frank pulmonary tuberculosis.

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CLINICAL NOTE ON PARALYSIS OF THE DIAPHRAGM AND THORACOPLASTY IN ADULT PULMONARY TUBERCULOSIS

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Dr. J. Winter in an interesting thesis, suggested by Chadourne, endeavoured to establish the time involved before a good functional result is obtained from an artificial pneumothorax. His conclusions are as follows: " In four-fifths of the cases a good functional result has appeared during the first six months after the pneumothorax has been induced; 73 per cent. of complete examples have proved to be efficacious in the first three months; thus, in every case of pneumothorax, when the result is likely to be successful, it appears early. Thus it is exceptional that a pneumothorax which will produce clinical healing takes more than six months to prove its efficacy. If, after this period, a satisfactory clinical result is not obtained, other procedures become necessary; it is not only useless, but even dangerous, to keep up a pneumothorax which has proved ineffectual."

These conclusions are not surprising, for they accord with general opinion on this question. Winter's study, however, by giving precise figures instead of mere clinical impressions, is of unquestionable value. For this reason we decided to make a similar enquiry based upon personal experience of the observations collected at the Belvedere Sanatorium and dealing with paralysis of the diaphragm and thoracoplasty.

The Time Factor for Successful Results after Paralysis of the Diaphragm.

We have taken into consideration 135 cases of phrenic evulsion and alcohol injection of the phrenic nerve performed between 1927 and 1937. The majority of these interventions were done in the period 1929 to 1934, when this treatment was under extensive trial. From 1927 to 1929 there are two cases; from 1929 to 1934, 100 cases.

Out of these 135 cases we have had forty-four successful results—that is to say, in almost exactly one-third. We must point out that by clinical

success we mean (*a*) a sputum free from tubercle bacilli, and (*b*) radiological healing of the lesions. If these two conditions are not fulfilled we have no right to speak of success.

Among these forty-four successful cases of paralysis of the diaphragm, thirty-seven obtained this result within six months (84 per cent.), and seven only between the sixth and eleventh months. As a rule, therefore, before coming to a definite conclusion with regard to the efficacy of phrenic paralysis it is necessary to wait at least six months for its effect to be achieved. Regular observation assists a forecast as to whether the final result is likely to be good. Even when improvement is delayed for a long time or the bacilli remain in the sputum there is still a prospect of a completely favourable result within six months.

As we pointed out in 1929, another conclusion resulting from our observations is that the phrenic operation should be judged as an independent form of treatment; it should be undertaken only if there is a reasonable prospect that it will, by itself, give a satisfactory result. The functional disturbance which results from this operation is too great for it to be done when the chance of success is slender or when it is obvious that if it fails thoracoplasty will be needed later.

As the result obtained from paralysis of the diaphragm can be speedily evaluated, and as it must be regarded as an independent form of treatment, we no longer use phrenic evulsion, but prefer an injection of the phrenic nerve with alcohol. The immediate result with this is the same, but it has the advantage (justified in one-third of these cases) that recovery of the function of the diaphragm occurs later, though only after one or two years. For this same reason we also use percainisation of the nerve, as suggested by d'Hour. To obtain a radical paralysis it is necessary to complete the operation by dividing a branch of the phrenic nerve connected with the subclavicular nerve.

We believe that successful results with paralysis of the diaphragm are, on the whole, as lasting as those obtained by other methods of collapse therapy. Relapses after complete healing are rare, numbering in our series only five cases.

The importance of prolonged post-operative treatment is paramount. All our cases were kept at rest after phrenic operations in a sitting position, which aids the elevation of the diaphragm, secures lung immobilisation, and thus assists healing. In addition, collapse therapy was supplemented where necessary by gold or tuberculin treatment where a favourable result from operation was delayed. It is difficult to assess the part due to these additional measures in the final result, though, in general, their effects were variable and uncertain.

It must be observed that to obtain satisfactory healing the post-operative rest cure should be extended much beyond the time required to obtain a clinically successful result with the aid of phrenic paralysis. The time factor in the successful treatment of pulmonary tuberculosis must necessarily be prolonged. There is a tendency in collapse therapy to pass too quickly from one method to another without waiting sufficiently long to judge the effectiveness of each trial, a policy that can lead to serious consequences.

The Time Factor for Successful Results after Thoracoplasty.

We have analysed the records of the cases of thoracoplasty at our disposal in order to ascertain the time required for a successful result. Our earliest cases date from 1930, the latest from 1937. In a series of fifty-seven cases there were twenty-six definitely good results—that is, 45·7 per cent. Of these twenty-six successful thoracoplasties a full result was obtained within six months in twenty (77 per cent.), and between the sixth and twentieth months in six. Of the thirty-one remaining patients, seven have been operated upon within six months; they are all doing well and should be successful. Twelve have not obtained a complete result after the lapse of many months (22 per cent.), and twelve are dead (22 per cent.), of whom eight (14 per cent.) died as a direct result of the operation. One of them died from pulmonary embolism when progressing favourably; the others were severe cases with uniformly bad prognosis before operation. It was suggested that they should undergo thoracoplasty for this reason. This is not the way to collect good statistics, but we have never believed that it is permissible to select patients for an operation in order to get good statistics. Thoracoplasty should not be proposed in the first months or even weeks of illness when there are still chances of cure by more simple methods of treatment, and it has been used in this series only when all the more simple methods of treatment have been employed without success.

Summary.

In conformity with general opinion, we believe that the results of collapse therapy in pulmonary tuberculosis are quickly evident. The time required is approximately the same for artificial pneumothorax, phrenic paralysis and thoracoplasty. A pneumothorax, however, when the lung is completely free, gives the quickest result; in three months 73 per cent. of our series of patients had very good collapse. On the other hand, with thoracoplasty a good functional result was obtained only after a rather longer time (23 per cent. between six and twenty months in our series), due mainly to the fact that it was performed on long-standing cases with hard fibrotic lesions.

THE TREATMENT OF SURGICAL TUBERCULOSIS IN ADULTS

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The problem of the tuberculous adult has three important aspects, which are closely interconnected, and which bear directly upon the difficulties still unsolved or only partly solved in many areas.

These three aspects are: (1) Provision of *facilities for treatment* in the form of beds in suitable institutions; out-patient after-care and rehabilitation for industry. (2) Early *diagnosis* so that the quickest and most complete care may be attained by treatment. This involves not merely skilful care but the co-operation of both patients and their relatives. (3) *Willingness of the patients* to undergo treatment in the early stages and prolonged enough to promote secure healing.

All these factors demand education of both the laity and the medical profession by judicious and persistent propaganda until the ideal organisation is obtained. The prevention of tuberculosis of the bones and joints may seem the aim which should have been mentioned first and which demands the most activity. But though its importance is primary and worthy of every effort, its attainment must be very slow. Meanwhile there are many actual sufferers becoming a burden to the community and to themselves. Moreover, prevention depends on many fields of endeavour which are being tackled by the State and by private organisations with increasing vigour—*i.e.*, a clean milk supply; the segregation of cases of contagious lung tuberculosis; better housing; better diet and better holidays for the nation as a whole.

Let us now consider in detail the three main difficulties already enumerated.

(1) *Provision of Treatment for Bone and Joint Tuberculosis.*—As the result of legislation and propaganda by the Ministry of Health, most local authorities are prepared to make some provison for the in-patient treatment of these cases, but many do not realise the full implications of the problem, and do not in fact provide complete facilities.

The demands of the Board of Education have resulted in the segregation of most children with bone and joint tuberculosis in hospital-schools equipped

for orthopædic treatment; but the view still holds in many areas that adults similarly affected can be dealt with satisfactorily in any general or cottage hospital which has a south balcony wide enough to take a bed. Consequently many of the best of these institutions are having their balcony-beds blocked by long-term cases, instead of using them for the benefit of cases of acute sepsis and convalescence after severe operations, to which they would do so much good. Moreover, special orthopædic facilities are lacking for tuberculous patients. The most important of these are (*a*) regular supervision by an experienced orthopædic surgeon; (*b*) nursing by experts who have the time as well as the knowledge to keep the apparatus in good order, so that no insidious deformities or pressure sores may develop; this co-operation is essential for successful results; (*c*) access to a splint workshop from which apparatus can be supplied, cheap, accurate in its fit and built on sound surgical lines; (*d*) continuity of treatment for patients in orthopædic out-patient departments after they return home.

These axioms, which are now trite in respect of the treatment of child-cripples in Britain, are not applied as widely as they should be to surgical tuberculosis in adults, because there has been a tendency to associate this with the facilities provided long ago for pulmonary cases. Even when in-patient treatment is available under the care of a surgeon, the after-care is often carried out in tuberculosis dispensaries staffed only by physicians. This means that the administrators of the area have not realised that a piece of apparatus, once supplied, needs continuous supervision by orthopædic experts if it is to remain efficient. Large sums may be expended upon appliances without any previous prescription by a surgeon.

It is desirable that adults with surgical tuberculosis should be segregated together in an institution large enough to be an economic unit and working in close association with a central orthopædic hospital, such as those built or planned in all the large centres of population in Britain. It is not essential that the T.B. hospital should be on the same site as the orthopædic hospital, provided it is within easy reach of the surgical staff of the latter, and enjoys access to the splint department. It may be convenient and economic to follow the example set in Dorset and Somerset, where there are hospitals each with about thirty surgical beds, equipped for all forms of orthopædic treatment except major operations. Patients requiring major operations, usually during convalescence, are then conveniently transferred by ambulance to the central hospital. The advantage of this method is not only economy in the operating surgeon's time, but economy in staff and equipment also, while the patients in the tuberculosis hospital are allowed to lead a routine life, undisturbed by the agitations inseparable from major operative work. New patients coming to the hospital, depressed

and toxic, find themselves in the company of many who, after years of patience, are beginning to enjoy normal activities and, with every appearance of robust health, are planning to resume an active place in the world. The psychological effect of this is extremely beneficial, but it is largely absent from any hospital where the majority of patients stay for a short time only, and where there is continual operative and other active treatment.

In the T.B. institutions occupational therapy plays a most important part, and, if it is taught by an expert with the right personality, it can make the weeks and months appear to pass so rapidly for patients that they benefit by the mental rest added to the bodily healing, instead of being wearied in spirit and constantly fretted by cares from the outer world.

After-care when the patient leaves hospital has been already referred to, and it plays quite as great a part in cases of tuberculosis as in any other orthopædic condition, for in this disease local healing is what is obtained, but " cure " must not be spoken of. In a scheme with a good morale it is not difficult to get patients to report regularly even when they are working. Thus the slight signs of commencing deformity or of a new lesion in some other part can be recognised before much mischief has been done. For such patients a serious relapse is a major disaster.

(2) *Early diagnosis* is one of the most difficult aspects of the problem under discussion because " lumbago " or " stiff hip," " stiff shoulder " or recurrent " sprain " in ankle and knee have no characteristic signs in the earliest stages; yet they steadily worsen from the measures which cure the conditions ordinarily associated with those names. X-rays do not show bone or joint changes till considerable destruction has already occurred, a point not yet sufficiently appreciated. The introduction of X-rays, far from simplifying our work, has induced a great deal of unjustified optimism in regard to certain cases which as a result come for orthopædic treatment much later than they need. The writer had two cases of tuberculosis of the sacro-iliac joint in young girls, who looked well and were able to continue at work with only slight " sciatica " until in each an abscess that contained tubercle bacilli appeared under the skin. Even with the greatest care, early diagnosis may be impossible in a few such cases.

It is by no means always the oversight of the practitioner which leaves the patient to seek treatment very late. A man fit enough to work may not seek advice until the swelling formed by an abscess warns him of serious disease. One young quarryman who came under the writer's care recently worked for a year in spite of occasional " lumbago "; then a lower abdominal abscess led to consultation with his panel doctor for a supposed " rupture." Another farm-worker suffered for a year from backache before seeking

advice for a large hump on his back due to collapse of four tuberculous vertebræ; these failed to heal even under orthopædic treatment, caused paralysis of his legs, and eventually improved only after a bone-graft. These instances show the difficulties with which the family doctor is faced when he encounters case after case at his surgery of " lumbago," " sciatica," and " rheumatic " joints. Such cases if not cured or making rapid recovery within a few months should be referred to an orthopædic surgeon for expert observation with regular X-rays.

If there is any history of former pulmonary disease or of tuberculosis in the family or of such symptoms as night-sweats and recurrent feverish attacks, this care is still more essential. Like all preventive measures, it is tedious and expensive, and will throw an added burden on our orthopædic schemes, but it will undoubtedly save a great toll of human life and misery.

The inevitable difficulty of diagnosis in these cases means that to ensure success a considerable number of cases of backache and arthritis should be admitted to the tuberculosis hospital for the final diagnostic test of treatment. In many the diagnosis is then quickly decided by rapid improvement within a few weeks; in others a year may pass before they are fit for home life; all these latter have serious joint diseases whose treatment is identical with that of tuberculous cases, only fortunately it need not be so prolonged.

Some tuberculosis officers are not willing to allow admission to their institutions until diagnosis is certain and notification has been made. This sometimes means waiting till an abscess has burst and many complications have arisen. Similarly, if diagnosis is revised after hospital care, there is difficulty in cancelling previous notification. The total statistics for the country are thus apt to be vitiated.

This matter of the provision of beds for diagnosis alone in doubtful cases is eminently one for propaganda amongst public authorities. Each committee is unwilling to take on the burden of expenses which it feels may be apportioned to another body; while the medical officer, who is the servant of the committee, hesitates to be blamed for extravagance. Yet until such beds are available the most economic results will not be obtained in the treatment of adult tuberculosis.

Another difficulty in connection with the provision of an adequate number of beds is that no accurate census is available of patients with frank tuberculosis, let alone of those in whom it is suspected.

Although tuberculosis is a notifiable disease, a large proportion of the cases escape notification because the onset and progress are so insidious that there is justifiable doubt often as to which stage justifies a definite diagnosis. Moreover, patients are apt to regard notification as a stigma. A satisfactory

scheme of treatment available immediately after notification is an inducement to the practitioner to notify; but if no advantage is gained, he may well feel justified in waiting for the discovery of tubercle bacilli in an abscess, or X-ray evidence of gross bone destruction. Such criteria, pointing as they do to a late stage, are very unsatisfactory from the point of view of treatment. In view of these considerations there are many patients with hump-back who have reached quiescence spontaneously without systematic treatment and who are not on the registers of public authorities; many with discharging abscesses of uncertain origin, and others with pulmonary tuberculosis who have a bone complication. None of these patients are included in present-day plans for orthopædic institutions. This is a matter slow to be remedied. A similar difficulty occurred in the beginning of orthopædic schemes for children, since the public authorities formed their estimates of numbers from the records of school medical officers, largely overlooking the fact that many cripples had been unfit for school and many minor defects were being treated in a casual way in private and hospital practice, but later applied for treatment under the schemes.

(3) *Patients' Co-operation.*—It is useless for the general practitioner to be gravely concerned over early diagnosis and for the public authorities to spend vast sums on first-class hospitals unless those who are the unfortunate victims of this disease realise that it is not only their privilege to avail themselves of such facilities, but their duty to the community and to their own dependents to seek early treatment and to continue it until they are fit to return to normal occupations. To produce this willingness requires much education of public opinion. The patient needs to be made to believe that the disease is curable when treated early, as it is, and to realise that although a stiff joint or stiff spine nearly always results, yet when the organs are kept in the best functional position by skilled orthopædic treatment, recovery for vigorous work is common.

Conversely, if the disease is neglected till an abscess bursts or gross deformity occurs, the period of treatment necessary is apt to be doubled; as the shortest time is about two years, this is extremely serious. Furthermore, there is not only an immediate risk to life, but the abscesses may fail to heal in spite of proper treatment, though the patient may linger on for years, putting an intolerable burden on his relatives.

Many of these patients are in the thirties, and those who can be persuaded to take the long and only economic view realise that even four years off work will leave a long life of usefulness ahead. The moral training in patience and courage stands them in good stead in the other difficulties of life, and employers should be reminded that individuals who have passed

such a test are likely to make more valuable workers, with greater perseverance and desire to keep their job, than the average healthy adult in a world where work is beginning to be regarded as a curse and rapid change as the chief end in life.

Industrial Rehabilitation.

In regard to the form of work to which these patients can return when fit, many cannot take up their own jobs, but practically all can do remunerative work. This is especially so now that factories are bringing light jobs into the heart of the country where farm-work of a heavy nature was formerly all that was available. This is unsuitable for some patients with healed spinal caries.

Patients with stiff hips do best standing at a bench, and if otherwise sturdy are capable of heavy carrying such as occurs in joinery work, though not of climbing about scaffolds. Much the same applies to those with stiff knees, though sitting is more comfortable for them; their chief difficulty is sitting in public vehicles, as the limb cannot be tucked out of the way.

Patients with tuberculous spines are wise to avoid jobs with weight-lifting, especially if this involves bending and lifting objects; a sudden slip may strain a soft vertebra and activate an old focus of disease. Even when the spine has been grafted, the new bone only fixes some vertebræ and extra strain is thrown on those at the end of the graft, so that it is not uncommon to find a new focus of disease there.

CONSULTATION

CASE

By H. MORRISTON DAVIES,
F.R.C.S.

The following case brings into consideration the very difficult problem of when one should agree or refuse to hazard the risks of thoracoplasty owing to the presence of active disease in the opposite lung. A *sine qua non* of an affirmative decision is, of course, that the patient should appreciate fully the magnitude of the risks: but, even when urged by the patient, it is the surgeon who must finally decide.

M. B., aged thirty-one, had suffered from breathlessness of a mild degree for seventeen years. This had been labelled "heart trouble," though there was no cardiac lesion and no history of rheumatic fever.

In 1936 she developed "loss of voice" in the morning, she had some cough, and experienced transient pains in the right chest. In August, 1936, there was a small hæmoptysis. She was sent to a sanatorium, and was discharged as healed in three months. Though continually complaining of pains, of cough, and of feeling ill, she was assured she was all right.

The sputum was examined in June, 1937, and was found to be positive. She was admitted under my care in August. She was over-fat, there was pyrexia, some cough, but no sputum; she had night sweats and was breathless on exertion. Pulse 84, respirations 20, blood pressure 136, systolic and sedimentation rate 16 in the first hour.

There was extensive and active disease throughout the right lung, with a large cavity and a smaller one in the upper lobe. There was also clinical and radiological evidence of active disease in the left lung spreading to the axilla from the hilum.

An A.P. was induced on the right side, but was only partially successful, as the apex of the lung was adherent. It was, however, persisted with, as the cavities were considerably reduced in size by the collapse, and the disease in the lower half of the lung was controlled.

Two months after admission there was some extension of the disease in the left lung, which soon, however, showed evidence of subsiding again.

A small effusion was found to be present on the right side in November. By February, 1938, the effusion had increased considerably: the fluid was clear and no T.B. were found after centrifugalisation. The appearance of the cavity had changed, and there was a shadow which might have been due to a divisible adhesion. The left lung was still active, but the signs were much fewer.

The patient was thoracoscoped in March. There was no divisible adhesion; the apex of the lung was uniformly fused to the chest wall. The surface of the lung was thickly studded with discrete and fused tubercles. Three pints of straw-coloured fluid were removed. The A.P. was abandoned and the lung gradually re-expanded as the fluid, which had reaccumulated, became absorbed.

By May the cough had become most troublesome and incessant, there was considerable sputum, which was positive, and the cough was frequently associated with vomiting. The general condition of the patient began to deteriorate. Crepitations could still be heard on the left side, but the lung was drier than at any time previously.

The patient became increasingly desirous that a thoracoplasty should be done, though realising that the risks, because of the left lung, were considerably above the average. The outlook was obviously otherwise hopeless.

The first stage was done on September 4. The whole of the first two ribs were removed, also 12 cm. of the 3rd and 4th ribs and the 2nd, 3rd and 4th transverse processes. This was followed by an acute but transient exudative reaction in the left lung, which subsided during the ensuing month.

The second stage of the operation was not done till eight weeks after the first; 12 cm. of the 5th, 6th, 7th and 8th ribs were removed and the transverse processes of the 5th to 7th inclusive. This produced an excellent collapse with complete obliteration of the cavities and abolition of all cough and sputum. There has been progressive improvement since in the patient's general condition.

After the second stage there was again slight congestion of the left root and a temporary increase in the crepitations. Because of this, although the left lung is quieter than it has been since admission, and because, also, the cavities are closed and the symptoms have disappeared, the third stage (resection of the 9th and 10th ribs) has not been done.

OBITUARY

SIR ROBERT PHILIP

It is with the deepest regret that we record the death of Sir Robert Philip in January last at the age of eighty-one.

Born in Glasgow in 1857 he was educated at Edinburgh High School and Edinburgh University, where he graduated M.B. with honours in 1882. In 1887 he obtained the University gold medal for his M.D. thesis on the ætiology of phthisis. In that year also he founded the Victoria Dispensary for Consumption at 13 Bank Street, Edinburgh, consisting of three small rooms and financed by a few personal friends. This was the first organised attempt to detect tuberculosis in its early stages, or to follow up patients and contact cases. Later a hospital, sanatorium and farm colony were added and the Dispensary became the Royal Victoria Hospital for Consumption and Farm Colony. This was subsequently taken over by the Corporation and Sir Robert Philip continued as consultant.

The funds which remained after the hospital, dispensary and farm were taken over by the Corporation were managed by the Royal Victoria Hospital Tuberculosis Trust. In 1917 a Chair of Tuberculosis was founded by this Trust at Edinburgh University and Sir Robert was appointed the first professor.

Subsequently he received many honours, particularly in appreciation of his work on tuberculosis. The Universities of Glasgow and Wales conferred on him the honorary degrees of LL.D., and the University of Egypt the honorary degree of M.D. He was an honorary Fellow of the Royal College of Surgeons of Edinburgh, a Fellow of the Royal Society of Edinburgh and of the Royal College of Physicians, London. In 1928 he was awarded the Trudeau Medal from the National Tuberculosis Association of the United States. In 1913 he was knighted, and he was an honorary physician in Scotland to His Majesty King George V.

He was curator of the research laboratory of the Royal College of Physicians of Edinburgh for fourteen years, and was president of the college for five years from 1918. He was also, at various times, president of the British Medical Association, the Association of Physicians of Great Britain and Ireland, the Tuberculosis Societies of Great Britain and of Scotland, and the Medico-Chirurgical Society of Edinburgh.

Sir Robert Philip was a pioneer in the administration of preventive measures for tuberculosis, and, as with all pioneers, met with opposition at first. But his deep sincerity of purpose, enthusiasm and energy triumphed

over every obstacle, and he lived to see the system of which he was the originator become a model for anti-tuberculosis schemes not only in this country but in many other parts of the world. As long ago as 1890, at a meeting of the Edinburgh Health Society, he proposed that tuberculosis should be made a notifiable disease, though it was not until 1906 that the Local Government Board for Scotland recognised tuberculosis as an "infectious disease within the meaning of the Public Health (Scotland) Act of 1897." He contributed much to periodical medical literature, and was the author of several books on tuberculosis, notably *The Prevention of Consumption* published in 1899, and *Tuberculosis among Children in Scotland* in 1908.

Hundreds of Edinburgh graduates remember him as a great teacher and clinician, for he gave distinguished service on the staff of the Royal Infirmary from his appointment as Assistant Physician in 1890 until 1921. His gifts as a teacher, his infectious enthusiasm, and his outstanding common sense constantly attracted around him a succession of keen and able young men.

Sir Robert Philip married twice. His first wife, Elizabeth, the daughter of John Fenton Motherwell, of Co. Sligo, died in 1937. Last year he married Edith McGaw, who had for many years engaged actively in anti-tuberculosis work in London.

C. H.

JANE HARRIETT WALKER

We regret to record the death in November last of Dr. Jane Walker in her eightieth year.

Throughout her medical career her predominant interest was tuberculosis, with particular attention to occupational therapy and after-care. In 1892 she introduced sanatorium treatment to England, and in 1908 opened the East Anglian Sanatorium near Colchester. She gave her energy and knowledge to many causes, and was a member of the Astor Departmental Committee for Tuberculosis, and for the last twelve years of her life was a member of the Joint Tuberculosis Council.

Dr. Walker was made a Companion of Honour in 1931, and also an LL.D. of the University of Leeds. There is now a project to establish the Jane Walker Juvenile Research Clinic at Nayland in her memory.

She was a woman of great humanity, humour and energy, and her death is not only a loss to the medical profession as a whole, but to the many organisations which exist to combat tuberculosis and to deal with its administrative aspects.

C. H.

MEETINGS OF SOCIETIES

JOINT TUBERCULOSIS COUNCIL

The Joint Tuberculosis Council held their quarterly meeting on February 18, 1939, at the house of the Society of Medical Officers of Health, 1, Thornhaugh Street, Russell Square, London, W.C. 1. Dr. G. Lissant Cox (in the absence from the country of Dr. S. Vere Pearson) presided.

Tribute was paid to the late Dr. F. W. Goodbody and Sir Robert Philip.

Congratulations were conveyed to Sir William W. Jameson on his knighthood.

Important discussion took place on the draft memorandum presented by the committee (with Dr. James Watt as convener) appointed to consider the "Organisation of the Tuberculosis Service in Time of War." The report was amended in several respects, and the final copies will be published shortly. Briefly the report envisages the necessity for the tuberculosis service to continue its work during war-time and to be ready to deal with a probable rise in tuberculosis morbidity; the examination of patients referred from recruiting authorities, men discharged from the Forces with tuberculosis, and the movement of population by evacuation schemes. With the probable departure of the younger tuberculosis officers for medical service, the simplification of records and of all non-essential work should be planned now. The economical use of tuberculosis institutional accommodation is outlined; and the immediate action to be taken on the declaration of a national emergency is enumerated. Justice can only be done to this important report by a fairly full review of its contents when it is published in the next few weeks.

Dr. F. R. G. Heaf reported that arrangements were being made for a series of post-graduate courses as follows: (1) In London (May) for tuberculosis officers. (2) At Heatherwood (May). (3) In Lancashire (June). (4) An intensive course for general practitioners—London (date to be fixed later). (5) A course at Cheshire Joint Sanatorium to be arranged to suit the convenience of Dr. Edwards. (6) A course in Radiology with Dr. Paton Philip at Cambridge.

A report on "Skiagraphic Terminology" in pulmonary disease was presented by Dr. G. Jessel, the convener of a committee of five with four

co-opted radiologists. The report draws attention to the lack of uniformity at the present time in reporting on skiagrams, and a number of recommendations are made to improve the position, including the use of certain phrases for particular meanings. Here again it was decided to have the report printed and circulated to constituent societies and to the medical press.

Among other matters considered by the Council were: (1) "Major Surgical Treatment of Pulmonary Tuberculosis, its Indications and Scope"; and (2) "The Institutional Treatment of Children Suffering from Pulmonary Tuberculosis." Committees were appointed to report to the Council on these subjects, the conveners being, respectively, Mr. J. E. H. Roberts and Dr. Peter Edwards.

The Hon. Treasurer's financial statement, showing a balance in hand of £67 1s. 9d., was adopted.

The following officers were elected for 1939: Chairman, Dr. S. Vere Pearson; Vice-Chairmen, Dr. G. Lissant Cox and Dr. D. A. Powell; Hon. Treasurer, Dr. G. Jessel; Hon. Auditor, Dr. D. P. Sutherland; and Hon. Secretary, Dr. J. B. McDougall.

The next meeting of the Council was fixed for Saturday, May 20, 1939.

TUBERCULOSIS ASSOCIATION

A MEETING of the Association was held on February 17, the President, Dr. G. T. Hebert, taking the chair. The subject for the first session, taken by Mr. James Carver, was "Genito-Urinary Tuberculosis." The speaker said that the early symptoms of renal tuberculosis were not appreciated; and that genito-urinary tuberculosis was regarded as a disease in itself, rather than as a manifestation of a generalised tuberculous condition, with the result that adequate convalescence and expert after-care were not insisted upon. The first symptom was frequency of micturition, and the next hæmaturia. Diagnosis could usually be made by culture of the urine on Loewenstein's medium and intravenous pyelography. Tuberculous bacilluria was usually due to a focal tuberculosis of the kidney, but since this was not always the case, the kidney should never be removed unless there was radiographic evidence of renal damage. In the seminal tract the epididymis was usually the first part to be involved. The treatment for renal tuberculosis was nephro-ureterectomy, complete removal of the ureter being essential except in very early cases, to prevent the formation of a renal sinus and breakdown of the operation wound. For tuberculous epididymitis, epididymectomy with removal of the vas up to the level of the internal ring was sufficient. The testicle was rarely involved, even in

late stages of tuberculosis of the epididymis, and should be preserved. Finally, the speaker emphasised the paramount importance of proper convalescence and supervision for at least eighteen months after either operation.

At the evening session four short papers were read. The first, on "Cadmium in the Treatment of Pulmonary Tuberculosis," was read by Dr. Basil Roberts, who described his results in a series of 32 cases. In nearly all the cases the initial dose was 0·5 c.c. of the 1 per cent. emulsion, two injections weekly being given. No untoward reactions were noted in any case. The results were in no way remarkable, but the speaker advocated a more extended trial.

Dr. Philip Ellman followed with a paper on "Healing by Natural Resolution in Pulmonary Tuberculosis." He said that clinical and radiological observations of the chest had shown that any fresh tuberculous pneumonic or broncho-pneumonic process of the recent exudative type might actually heal by resolution in a manner comparable with that observed in lobar pneumonia and broncho-pneumonia, with the difference that in a tuberculous lung the time factor for resolution was much more prolonged, requiring possibly months of complete bed rest. The immediate institution of collapse therapy in such types of localised lesions was not in his opinion justified. In cases of the productive type of disease, however, collapse therapy should not be unduly delayed.

The next paper was read by Mr. G. E. King Turner, whose subject was "The Teeth as 'Indicators' in Pulmonary Tuberculosis." He said that in a large majority of cases the presence of decalcification of the teeth, depending on the tendency to an acidosis, coincided with activity of a tuberculous lesion. The dental condition pointing to an alkalosis—*e.g.*, pyorrhœa—had been found to coincide with a resistance to tuberculosis. The teeth were sensitive to any prolonged alteration in the reaction of the saliva.

The last paper was read by Mrs. White, C.S.M.M.G., from the Thoracic Unit of St. Mary Abbot's Hospital. Her subject was "Pre- and Post-Operative Physiotherapy for Surgical Conditions of the Thorax." Since this work had begun nearly two years ago, its scope had become enlarged and now included the pre- and post-operative treatment of many pulmonary conditions. The treatments consisted essentially of localised breathing exercises (to teach the correct use of the lungs and to encourage the expansion of the affected lung), mobility and postural exercises (to prevent limitation of movement or deformity), and general ultra-violet irradiation (to raise the resistance and stimulate metabolism). In bronchiectasis special emphasis was laid on the importance of pre-operative treatment.

In the treatment of lung abscess, in addition to the other measures enumerated, there was a daily administration of infra-red rays to promote healing and relieve pain. Local irradiation of the cavity with the Kromayer lamp used with applicators was also important, in addition to the general irradiation. Thoracoplasty subjects were taught before operation the movements they would be expected to make on the third day after operation.

INTERNATIONAL UNION AGAINST TUBERCULOSIS

THE Eleventh Conference of the International Union against Tuberculosis, whose permanent headquarters are in Paris, 66, Boulevard St. Michel (Secretary-General Professor Fernand Bezançon), will meet in Berlin from September 16 to 20, 1939, under the chairmanship of Dr. Otto Walter.

Discussions will be limited to three main subjects—Biological subject: "The Problem of the Virulence of the Tubercle Bacillus," opening report by Dr. A. Boquet (France) and Dr. A. Saenz (Uruguay). Clinical subject: "The Value of Systematic Examinations for the Detection of Tuberculosis in Subjects over Fifteen Years of Age," opening report by Dr. H. Braeuning (Germany). Social subject: "The Rehabilitation of the Tuberculous," opening report by Sir Pendrill Varrier-Jones (Great Britain) and Dr. E. Bachmann (Switzerland).

Speakers selected in advance from a list presented by the forty-three countries belonging to the Union have been designated to open the discussions on each of the questions on the agenda, as under:

Biological Subject.—Denmark, Dr. K. A. Jensen; Germany, Professor Bruno Lange; Great Britain, Dr. A. Stanley Griffiths and Dr. William T. Munro; Italy, Professor B. Besta and Dr. Carlo Cattaneo; Poland, Dr. Z. Skibinski; Portugal, Dr. Alberto Carvalho and Dr. Carlos Vidal; United States, Dr. Kenneth C. Smithburn; Yugoslavia, Professor J. Nedelkovitch.

Clinical Subject.—Argentina, Professor G. Araoz Alfaro and Dr. R. A. Vaccarezza; Finland, Dr. Toivo Ellilä; France, Dr. P. Braun and Dr. A. Courcoux; Great Britain, Dr. F. R. Heaf; Italy, Professor G. Costantini; Norway, Dr. H. J. Ustvedt; United States, Dr. Willard B. Soper; Yugoslavia, Professor F. Tchepulitch.

Social Subject.—Belgium, Dr. G. Derscheid; France, Dr. L. Guinard and Dr. Étienne Bernard; Germany, Dr. Dorn; Italy, Professor F. Bocchetti and Professor F. Parodi; Netherlands, Dr. W. Bronkhorst; United States, Dr. Kennon Dunham.

The Organisation Committee of the Conference has prepared a very fine programme of receptions and excursions, thanks to which the members

of the Congress will be able to visit the chief German cities and to become acquainted with the social institutions in Germany.

Members of the International Union are invited to take part in the Conference free of any contribution fee. They may forward their application either through the medium of their Government or their National Organisation against Tuberculosis, or directly to the Organising Committee in Berlin, at the following address: Konferenzleitung der XI Konferenz der Internationalen Vereinigung zur Bekampfung der Tuberkulose, Berlin, W.62, Einemstrasse 11.

Persons who are not members of the Union and who wish to take part as members of the Conference must forward their application, together with a contribution of 20 Reichsmarks (approximately 300 French francs), exclusively through the medium of the National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, London, W.C. 1.

Members of the family accompanying a member of the Union or a member of the Conference will be entitled to the same privileges on payment of a fee of Reichsmarks 12.

Reductions on hotel prices and railway fares will be granted to members of the Congress.

REVIEWS OF NEW BOOKS

Silicosis and Asbestosis. By various authors. Edited by A. J. Lanza, M.D. Oxford University Press. London. 1938. Price 25s.

This book, the product of a team of combined American and English workers, contains one of the most complete accounts of silicosis and asbestosis to be found in the literature. Every aspect—historical, ætiological, clinical, radiological, pathological, experimental, occupational, preventive, legislative and economic—is dealt with, and to every section detailed bibliography is appended. Especially commendable are the excellent sections dealing with radiological diagnosis by Eugene Pendergrass, and pathology by Roodhouse Gloyne, in both cases the rich essence of many years of patient and critical experience. Leroy Gardner contributes a chapter of almost a hundred pages on the experimental pathology of pneumoconiosis, much of which is unpublished material, the outcome of the recent researches instituted at the Saranac Laboratory. A fine and most readable account of the occupational and legislative aspects in this country is given by Dr. Middleton. The book is well produced and most of the illustrations are excellent. It is a work which all who are concerned with this important branch of industrial disease will wish to read and retain upon their shelves for reference.

On the State of the Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1937. H.M. Stationery Office, 1938. Price 3s. 6d. Pp. 235.

This business-like volume contains much that is of interest and importance covering a wide field of medical subjects. For the first time in recent years the mortality from pulmonary tuberculosis shows a slight rise, and this is correlated with the influenza epidemic which occurred at the beginning of the year. Evidence is forthcoming, too, that patients are still not fully aware of the vital importance of seeking early medical advice for symptoms of ill-health. Thoracic surgery in pulmonary tuberculosis is touched on, and a timely warning from Dr. Heaf is quoted concerning the imperative need for the most rigid care in selecting patients for surgical treatment. The possession of a good operative technique is not enough, and there appears to be a real danger of losing a sense of proportion and embarking on extensive surgical procedures without thorough preliminary skilled consideration.

Transactions of the Twenty-fourth Annual Conference, National Association for the Prevention of Tuberculosis. Held in London, June 29 to July 2, 1938.

This publication sets out the proceedings at the various meetings and gives the speeches made by the several officials and also the Minister of

Health. The four discussions are fully reported. The subjects were the development and organisation of anti-tuberculosis activities in rural areas, the family and tuberculosis, the discovery and protection of contacts in a tuberculous household, the control of tuberculosis in tropical and sub-tropical regions, and the mental aspects of tuberculosis. The speakers included Dr. Lissant Cox, Dr. Rist, Dr. Hebert, Professor Lyle Cummins, the late Dr. Bardswell, Dr. Rees and Dr. Petrie, to mention only a few names; and the subject-matter is clear, simply stated, and obviously of interest to medical and lay delegates alike. In spite of this some of the latter seem to have found the fare somewhat indigestible, and at the final meeting pressed for papers on the administrative side of tuberculosis. One of the important functions of this association at its meetings and elsewhere is the education of public opinion in the problems of tuberculosis, and it is to be hoped that "the administration" will not be allowed to assume an importance greater than the very work which it exists to serve.

The Medical Pre and Circular, 1839–1939. A Hundred Years in the Life of a Medical Jou al. By Robert J. Rowlette, M.D., F.R.C.P.I. Price 10s. 6d.

This attractive and handsome book gives an account of the history of the *Medical Press and Circular*, written specially for the centenary year by Dr. Rowlette. Dr. Morland, in a foreword, sends editorial greetings from the *Lancet* (a fellow-centenarian) and buries the hatchet of earlier strife. It is perhaps not surprising to find that the *Dublin Medical Press* was, in its early years, never free from controversy. This was both personal and political, and could show at times remarkable changes of front. Thus in 1839 it remarked on "the cool effrontery with which Dr. Robert James Graves attempted to depreciate the whole mass of the profession in order to elevate himself and those whom he wished to promote to the honourable position of jackalls to him." Reviewing his *Clinical Medicine* in 1843, the journal observed, "The work has not been got up (like many with which the press teems at the present day) for the purpose of puffing its author into a momentary notoriety," while the review of the second edition was even more complimentary. Dating as it does from the days before the Medical Act of 1858 and the institution of the General Medical Council, the *Medical Press* was from the first concerned with matters of medical policy. The organisation of the profession was always a matter of concern to the authors, and the journal conducted a campaign on behalf of the Poor Law or Dispensary doctors which was to result in greatly improved working conditions for them. In 1866 union with the *Medical Circular* took place, and the journal took the name of the *Medical Press and Circular*. Its control remained largely Irish, and the combination was probably more an absorption by the *Medical Press* than a union on equal terms. In later years it became less and less Irish, and since the death of Arthur Jacob, son of the fonnder and first editor of the *Medical Press*, at the beginning of this century, it has been an entirely English journal. In the eighteen-nineties the *Medical Press and Circular*, in common with other papers, championed the cause of medical men in the Army Medical Service, and many of their injustices

and grievances were removed. The book is full of interest, and contains many sidelights on medical history and personalities of the last hundred years.

A Synopsis of Medicine. By H. Letheby Tidy, M.A., M.D., B.Ch.(Oxon), F.R.C.P.(Lond.). Seventh edition, revised and enlarged. John Wright and Sons, Ltd., Bristol, 1939. Price 21s.

This new and revised edition of Dr. Tidy's well-known book makes a timely and welcome appearance. The book is already a long-established favourite, and revision has now included able summaries of many rapid advances of recent years. To mention but a few, the new insulins, the advances in knowledge of hormones, vitamins and diseases of the blood are all given adequate description. Many sections have been largely rewritten and several new ones added. Sulphanilamides are dismissed rather briefly, and certainly deserve more than a note that they have proved beneficial in streptococcal infections and that research is proceeding. The section on coronary thrombosis is brief and omits altogether any mention of the clinical features of complications. A more general criticism, common to many other works on medicine also, is that treatment is given but scant reference.

In general, however, the book shows the widest evidence of that concise and balanced knowledge which is the hall-mark of the experienced teacher. Yet with these qualities it is still a mine of information, easily accessible and splendidly indexed.

St. Thomas's Hospital Reports. Volume III., Second Series, London, 1938. Edited by Professor O. L. V. S. de Wesselow and Mr. C. Max Page. Price 10s. (7s. 6d. to subscribers).

This latest addition to the series of Reports from St. Thomas's Hospital is in every way a worthy successor to former volumes. It is a beautifully produced book that has been edited with obvious care and skill. With a wide range of subjects included and all the articles of sound merit, it is no easy task to select any for special comment. But the reviewer's interest was stimulated especially by the late Leonard Dudgeon's masterly account of an early example of X-ray carcinoma, by Wesselow and Thomson's detailed investigations upon serum potassium and sodium in Addison's disease, by the paper from the Registrar's Department analysing the results of treatment in patients with ulcerative colitis, by the interesting paper from Bourdillon and his colleagues on the mild anæmias of pregnancy, by the fine review of recent work on putrid lung abscess by Barrett, and by Anwyl-Davies' paper dealing with the modern treatment of gonorrhœa. In all there are some eighteen articles given in full, and in addition abstracts of twenty-two other papers published by St. Thomas's men during 1938. No better tribute to the spirit and achievement of the voluntary hospital system in London exists than the consistent merit of the series of reports which emanate from so many of the larger members, a success amply sustained by this latest addition.